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# THE AMERICAN JOURNAL OF PHARMACY.

JANUARY, 1893.

## THE COLORING PRINCIPLE OF POKE BERRIES.

BY HERMAN HARMS.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 118.

Read before the Philadelphia College of Pharmacy at the Pharmaceutical Meeting, Dec. 20.

In order to determine the constituents and more particularly the coloring principle of this fruit, 32 grams of the berries, dried at 100° C., were subjected to usual plant solvents with the following result:

	Percentage.
Petroleum ether, . . . . .	.012
Stronger ether, . . . . .	.027
Absolute alcohol, . . . . .	.024
Distilled water :	
Mucilage, . . . . .	2.74
Dextrin, . . . . .	3.52
Glucose, . . . . .	8.09
Saccharose, . . . . .	1.46
Carbohydrate, . . . . .	1.13
	—16.94
Sodium hydrate solution :	
Pectin and albuminoids, . . . . .	1.47
Dilute hydrochloric acid :	
Pararabin, . . . . .	1.28
Residue (chiefly seeds), . . . . .	76.32
Ash, . . . . .	.95
Loss, . . . . .	2.977
	100.000

The ripe fruit, dried at 110° C., was found to contain 71.26 per cent. moisture, and on ignition left a greenish ash, containing compounds of K, Na, Ca, Mg and Mn, as well as phosphates. Petro-

leum ether extracted a small quantity of greenish fat, soluble in alcohol, from which separated a crystalline wax. Stronger ether extracted a peculiar olive green, strongly odorous fat, which, when digested with water and this treated with Fehling's solution, gave a slight reduction. The residue of the alcoholic extract consisted of dark brown resinous matter. The berries were next subjected to distilled water, which was colored at once a bright red, and extracted the compounds mentioned above besides citric and tartaric acids. Pectin, albuminous matter and pararabin were extracted by dilute solutions of sodium hydrate and hydrochloric acid. The residue consisted now almost entirely of the whole seeds. These were coarsely powdered and subjected to a partial analysis, with the following results:

Moisture, . . . . .	17.62
Ash, . . . . .	.98
Petroleum ether, . . . . .	10.94
Stronger ether, . . . . .	.91
Absolute alcohol, . . . . .	2.48
Residue, . . . . .	67.07
	<hr/>
	100.00

Petroleum ether extracted a yellowish, bland, inodorous fixed oil, which deposited a crystalline precipitate. The oil was digested with acidulated water and this tested with Mayer's reagent and Fehling's solution with negative results. The ethereal extract, digested with water, gave an acid reaction and a dark olive green color with  $\text{Fe}_2\text{Cl}_6$ . Acidulated water as well as an alcoholic solution of this ethereal extract were tested for alkaloid and glucoside, giving no indication for the former, but a slight reduction of Fehling's solution for the latter principle. Absolute alcohol extracted from the seeds a brownish red crystalline substance, which was treated with water and the aqueous portion tested as follows:  $\text{Fe}_2\text{Cl}_6$  gave a dark greenish precipitate;  $\text{NaOH}$  a brown color, and subsequent treatment with Fehling's solution a precipitate of  $\text{Cu}_2\text{O}$ . The residual alcoholic extract was then treated with acidulated as well as alkalinated water, and both portions shaken respectively with petroleum ether, stronger ether and chloroform. The stronger ether extracted from the acidulated portion a colorless crystalline principle, which was soluble in chloroform and alcohol, slightly in water, and gave with  $\text{H}_2\text{SO}_4$  a bright yellow color, which



soon changed to brownish yellow.  $\text{HNO}_3$  produced the same effect. This principle is evidently the phytolacein of Claussen. (See U. S. Disp., 16th ed., p. 1150.)

*The Coloring Principle.*—Several methods of obtaining this principle by precipitation were tried with negative results, but the following seemed to yield the purest product. The juice of the ripe berries was treated with an equal volume of alcohol and the mixture filtered after 24 hours. The filtrate after agitation with stronger ether was evaporated in a vacuum, the residue dissolved in 75 per cent. alcohol and filtered. The filtrate was evaporated under reduced pressure and yielded a bright purplish red powder. This powder was insoluble in absolute alcohol, ether and chloroform, but was readily dissolved by water, yielding a bright red or purple solution, according to the strength of the solution. The aqueous solution was turned yellow by alkalis and reddened again by the addition of an acid.

On treating the aqueous solution with an excess of  $\text{Fe}_2\text{Cl}_6$ , or chlorine water, it was decolorized; the same result was obtained by strong oxidizing as well as reducing agents. Boiling the solution had no effect, but with addition of  $\text{HCl}$  and continued heat, the solution was gradually decolorized. No change was caused by alum, cream of tartar or stannous chloride; subacetate of lead produced a light purplish precipitate. An attempt to obtain the coloring principle by this reagent was a failure, due to the decomposition after separation of lead by hydrogen sulphide. On heating the aqueous solution with Fehling's solution, it gave an abundant precipitate of cuprous oxide. By previously heating with diluted acid, no increase in the reducing power on Fehling's solution was noted. An aqueous solution with a little alcohol has not been altered by exposure to sunlight for 14 days, nor has any appreciable amount of color been lost by exposing writing, in which it served as ink, to the same agent. Failures in preparing a permanent red ink from the berries have largely been due to the use of the impure juice, and here might be recommended a 2 to 5 per cent. solution of the coloring extract, preserved by the addition of ten per cent. alcohol and one per cent. of glycerin. A solution of the coloring principle may be used as an indicator in the titration of acids; however, a rather strong solution must be used, and in most cases phenolphthalein is preferable.

## CICUTA MACULATA, LINNÉ.

BY AUGUSTUS S. BLACKMAN, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 119.

This plant is known under the common names of Water Hemlock, Spotted Cowbane, Beaver Poison, etc. It is found throughout eastern United States, and flowers during July and August. The stem dies down after fruiting, but a bud and new tuberous roots are formed from a lateral branch, and a new stalk rises from these the following spring.

The root is oblong, fleshy, of a brownish color, with from three to eight thick fleshy branches which grow in an oblique or horizontal direction. The interior of the root is yellowish white, and contains many cavities, which are probably formed by absorption of the tissue; this is an important characteristic, and is best seen in longitudinal section.

The odor is aromatic, resembling that of parsnip.

The taste is aromatic and sweetish, with an acrid after-taste. On cutting a cross section of the fresh root a yellowish, resinous liquid is observed issuing from a zone of resin cells.

A number of cases of poisoning have at various times been reported, due, no doubt, to this root having been mistaken for that of the parsnip, or of sweet cicely.

For the following investigation a quantity of the roots of *cicuta* was collected in July and allowed to dry, and about three months afterwards a portion of the finely powdered drug was submitted to analysis with the following results:

Solvent Used.	Substance Obtained.	Per Cent.
Petroleum ether, . . . . .	{ Volatile oil, . . . . .	.068
	{ Fat, . . . . .	.540
	{ Wax, . . . . .	.376
		—
Stronger ether, . . . . .	Brown resin, . . . . .	.984
Absolute alcohol, . . . . .	Resin, . . . . .	1.380
		1.996
Distilled water, . . . . .	{ Mucilage, . . . . .	1.000
	{ Dextrin, . . . . .	1.500
	{ Glucose, . . . . .	3.555
	{ Extractive, . . . . .	2.445
		—
		8.500
Dilute solution of sodium hydrate, . .	{ Pectin, . . . . .	1.500
	{ Extractive, . . . . .	1.000
		—
		2.500

Solvent Used.	Substance Obtained.	Per Cent.
Dilute hydrochloric acid, . . . . .	Pararabin, . . . . .	2'900
Boiling distilled water, . . . . .	{ Starch, . . . . . 5'500	8'000
	{ Extractive, . . . . . 2'500	
Chlorine water, . . . . .	Lignin, . . . . .	2'396
Nitric acid and potassium chlorate, .	Incrusting matter,	10'264
	Cellulose, . . . . .	31'436
	Ash, . . . . .	11'608
	Moisture, . . . . .	9'127
	Loss, . . . . .	8'909
Total, . . . . .		100'000

The fat obtained by petroleum ether melted at 57° C., and the wax melted at 96° C.

Tests for alkaloids and glucosides in the ethereal and alcoholic extracts failed to indicate them.

A portion of the original drug was then distilled with milk of lime; the resulting distillate gave negative indications of a volatile alkaloid. A number of other tests were then applied to the original drug for alkaloids, but with negative results.

Some of the green root freshly gathered was then obtained, and tested by extracting with acid, rendering this acidulated solution alkaline, and agitating with ether; this ethereal solution on evaporation to dryness yielded a residue, which when dissolved in acidulated water gave alkaloidal indications with a number of reagents. The green drug, however, when distilled with milk of lime did not yield any indications of a volatile alkaloid.

Some physiological experiments were made on a full-grown healthy cat.

The dried drug used in the analysis failed to produce any unnatural symptoms when administered in five-gram doses. The green root, however, in two-gram doses produced great uneasiness, followed by vomiting.

The conclusions reached by this investigation are that there is probably a non-volatile alkaloid present in *cicuta*, and that it is either not present in the root in July, or else it is decomposed by drying. The evidences of alkaloid were obtained from the root collected in November.

## NOTES ON PRACTICAL PHARMACY.

BY JOSEPH W. ENGLAND, PH.G.

Read before the Philadelphia College of Pharmacy at the Pharmaceutical Meeting,  
Dec. 20.

*Glycerin Suppositories.*—The best method of preserving these from the decomposing action of the air is to enclose them, separately, in small, wide-mouthed, dry vials; tightly cork, dip cork and top of bottle into melted paraffin, and cool, when the contents will be perfectly sealed. The formula of Prof. Remington (Amer. Jour. Phar., 1892, p. 457), gives very good satisfaction. The practice of wrapping glycerin suppositories in paraffin paper or tin-foil is objectionable, mainly for the reason that ignorance may lead a user to insert suppository, wrapper and all.

*Sponge-cleaning.*—After beating to separate mineral impurities as much as possible, macerate in diluted hydrochloric acid to dissolve lime salts, wash in cold water, knead thoroughly by hand with green soap in hot water, rinse, immerse in a 1 : 20 carbolic acid solution and keep for use. This is the plan followed by Dr. Gersten, who says, in his well-known work on Surgery, that : Sponges once used in an aseptic operation can be used again. Careful washing out with green soap and hot water to remove fibrin and blood, and then immersion in a 1 : 20 carbolic acid solution is all-sufficient.

*Gargles.*—If there is any value at all in the antiseptic theory it should be carried out thoroughly. Gargles are often used in infectious conditions of the throat, and it is a logical necessity that where water is specified in their making, distilled or boiled water should always be used, whether specified by the physician or not. In the writer's experience, fluid extract of sumach has wholly replaced the older infusion of sumach, made from the berries, that used to be the delight of many physicians to prescribe in gargles.

*Hammond's Mixture* (modified).—The original formula for Hammond's Mixture called for pyrophosphate of iron and diluted phosphoric acid. The meta- form of the acid was usually recommended. Upon suggestion, some two years ago, the physicians of the Insane Department of the Philadelphia Hospital tried the official diluted orthophosphoric acid and phosphate of iron, in place of the meta-acid and pyro-salt usually used, with very excellent results; and the mixture, as modified, has been daily employed ever since. The modified formula is :

Take of—

Strychnine sulphate, . . . . .	2 grains.
Iron phosphate (U. S. P., '80), . . . . .	300 "
Diluted phosphoric acid, . . . . .	5 fluid drachms.
Syrup of ginger, . . . . .	{ of each } . . . . .
Syrup of lemon, . . . . .	
4 fluid ounces.	
Water, a sufficient quantity to make 1 pint.	
Mix by dissolving the solids in the water, which should be being hot, add the acid, and then the syrups.	
Dose—One to two teaspoonfuls. .	

*Copper Arsenite Mixtures.*—Copper arsenite is now being more or less used in diarrhœa, and occasionally it has been ordered in mixture form, instead of the usual pill. In such cases it is advisable to add a few drops of diluted hydrochloric acid, to dissolve the arsenical salt, or if the mixture be alkaline the compound will be dissolved. Attfield states that it is wholly insoluble in water. Whether dilute HCl affects the chemical character of the arsenite is unstated by Attfield, but even if it does, it would be a most dangerous procedure to dispense the mixture simply holding it in suspension.

*Ointment Block.*—Quite a bright idea is this new ointment slab or block, made of a number of sheets of parchment paper, backed card-board, and manufactured by Fox, Fultz & Webster, of Boston. The object of the block is that an ointment can be made upon the top sheet of the layer, the sheet removed and thrown away, and the slab will be ready for another ointment; thus doing away with the usual ointment slab and its frequent cleaning. Practically, however; there will be found, I fear, several objections to its use. First, with a stiff ointment it will be hard to thoroughly admix ingredients; second, ointments may be smeared over its sides and spoil the lower sheets, and third, the parchment paper may decompose chemical products mixed on it. Upon this sample "block," I have made some iodine ointment, and you will notice that the iodine has decomposed the paper. Still, the "block" is an ingenious idea and may find a certain application in the making of ointments.

*Gelatin Capsules.*—Within the past few years the usage of gelatin capsules has greatly increased, and the reason is not far to find, in that through them many efficient but unpleasant substances can be exhibited without offending the most delicate of palates. Among the more common products so used at the present time, there may be mentioned: Terebene, oil of turpentine, oil of



gaultheria, creasote, either alone or with cod-liver oil, copaiba, oil of sandalwood, apiol, and others. The capsules are filled with a minim graduate, and then capped in the way described by Mr. C. Carroll Meyer, before the College Meeting in December, 1891.<sup>1</sup> The capsules referred to are the familiar medium-hard, empty containers, with removable caps.

What I wish to bring before you now, however, is a new capsule—an *elastic*, empty gelatin capsule, or the so-called Merz capsule, made by the Merz Capsule Co., of Detroit. These capsules are ovoid gelatin-containers, filled with air, perfectly elastic and claimed to be as easily swallowed as an oyster.

To use, the directions are to place them upon a stick perforated with holes, remove tops with scissors, and fill with a medicine dropper. The capsules are then sealed with a hot solution of gelatin, made of gelatin, 3 parts; glycerin, 2 parts, and water, 5 parts (heated in a water-bath until clear of bubbles), and allowed to harden. They come in 5, 10, 15, 40 and 75 minim sizes.

Personally, my experience with them has not been sufficient to warrant a positive opinion as to their worth; what experience I have had, has been limited and unfavorable. The products are certainly ingenious in design; whether they will become as acceptable for every-day practical use as the older form of empty capsules, remains to be seen. They require much more trouble to fill, and if the increased work results in better products, they may find favor.

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## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*Alumnol*, one of the naphthol-sulphonates of aluminium, is a fine, white, non-hygroscopic powder, easily soluble in cold water; in hot water solutions containing 40 or more per cent. can be prepared without separating the salt upon cooling. Alumnol is not quite so soluble in alcohol, the solution showing a beautiful blue fluorescence; it is also soluble in glycerin, but is insoluble in ether. The substance contains 5 per cent. aluminium and 15 per cent. sulphur in form of the sulphonic group. Alumnol possesses reducing properties as shown with silver nitrate; with ferric chloride even in dilute solution a blue color results. Upon prolonged exposure

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<sup>1</sup> American Jour. Pharm., 1892, p. 17.



alummol darkens somewhat, but without loss of medicinal virtue. Alummol solutions precipitate albumen and gelatin, but the precipitates are soluble in excess of these substances, in consequence of which this astringent antiseptic will not cause the clogging up of pus-secreting sores. A special use of the substance in ophthalmical practice is noted by Wolffberg, a four per cent. solution dropped into the eye arresting the flow of tears for several minutes, thus enabling an easy examination.—Heinz and Liebrecht (*Berl. Klin. Wochenschr.*) *Pharm. Centralhalle*, 1892, 697.

*Analgene*.—Since the introduction of this compound (*Am. Jour. Pharm.*, 1892, 310) it has been found that the presence of the benzoyl radical in place of the acetyl radical was more desirable. The name *analgene* is henceforth only applied to the *o*-ethoxyana-monobenzoylamido-chinoline,  $C_9H_5NOC_2H_5NHCO C_6H_5$ ; it is recommended as an antineuralgic, in doses from 0.5–2 grams.—*Pharm. Centralhalle*, 1892, 698.

*Kresin*.—A name given to a solution of cresol in a solution of sodium cresoxyl acetate containing 25 per cent. cresols; the solution is miscible with water and alcohol in all proportions; it is less poisonous than phenol, and is said to have four times its antiseptic value and as a disinfectant to be especially valuable. In one-half to one per cent. aqueous solutions it is deemed of value in the treatment of wounds.—*Pharm. Centralhalle*, 1892, 698.

*Phenolin* or *water-soluble phenolin* constitutes a disinfecting agent made of crude cresols and potassium soap.—*Pharm. Centralhalle*, 1892, 698.

*Sodium peroxide*, a commercial article, appears as a deliquescent yellowish, sintered mass or powder; it is soluble in water with evolution of considerable heat and liberation of oxygen; in dilute acids it is soluble, forming hydrogen peroxide if the solution be kept cool. Because of its strongly alkaline character its use as a bleaching agent is restricted, since it attacks animal fibres; a recent patent application proposes the use of magnesium salts with the sodium peroxide, whereby magnesium peroxide is produced, which acts very favorably as a bleaching agent for wool, silk, mixed fibres, feathers, bristles, bones and ivory; bleaching in this manner is more quickly finished than with the use of hydrogen or barium peroxide. Under the name *Oxygen-powder* a mixture of magnesium sulphate and sodium peroxide can be purchased; in its use it is essential to

add it slowly in small portions to cold water.—(Bayr. Ind. u. Gewerbebl.) Pharm. Centralhalle, 1892, 699.

*Cytisine*.—The results of an extended investigation, during which attempts were made to solve the constitutional formula, are summarized as follows: The formula for cytisine is  $C_{11}H_{14}N_2O$ ; this alkaloid occurs in numerous species of *Cytisus*, also in *Ulex Europæus*; the alkaloid *ulexine* separated from the latter by Gerrard and Symons is identical with *cytisine*; the percentage of alkaloid in the seed of *Cytisus* according to researches by von Buchka and Magathaes is very variable. Cytisine is a diacid base forming two classes of well-crystallized salts; by distillation with soda-lime a pyridine derivative was obtained beside a base  $C_9H_{13}N$ , which is possibly a hydro-chinoline—A. Partheil, *Arch. der Pharm.*, 1892, 448-498.

*Alkaloid of the Geoffroya barks*.—The controversy regarding the origin of these barks, which were used as anthelmintics during the last century and beginning of this century, was never decided but gradually was forgotten with the dropping of the barks from the various Pharmacopœias. The "gray barks" of the time were undoubtedly from species of *Geoffroya*, whilst the "yellow barks" were just as certainly derived from a species of *Xanthoxylon*. Hüttenschmied in 1824, isolated from the "gray bark" an alkaloid which he called "*surinamine*," and which later was also known as *geoffroyine*; from the "yellow bark" which he believed to be *G. Jamaicensis* was isolated an alkaloid called "*jamaicine*," but which later was proven identical with *berberine*. According to the directions of Hüttenschmied it was possible to extract from the true bark the *surinamine* and confirm the tests given by him; it was also found that boiling water was the best solvent (1:200) that dilute alcohol dissolved less than water, and that in absolute alcohol, ether, chloroform, benzin, benzol, etc., it was insoluble. It has the formula  $C_{10}H_{13}NO_3$ , melts with decomposition at  $257^{\circ} C.$ , and forms salts with most acids (none with acetic acid; nitric acid even dilute gives picric acid), the hydrochlorate decomposes on addition of water; with alkalies it gives crystalline compounds; of the alkaloidal reagents only bromine water or bromine in potassium bromide solution gives a precipitate. It was found to be identical with methyl-tyrosin, with *angelin* prepared from the resin of *Ferreira spectabilis* and with *rhatanin*, a substance extracted from a commercial rhatany

extract, which in all probability was adulterated with an extract from a species of *Ferreira*. The barks of *Andira inermis* and *A. anthelmintica* also contain this principle. It is proposed to call this principle (methyl-tyrosin) *andirin* and drop the names surinamine, geoffroyin, rhatanin and angelin.—O. Hiller-Bombien, *Arch. der Pharm.*, 1892, 513-548.

*Strychnos Alkaloids*.—The wood of *S. Nux vomica*, according to F. A. Flückiger, yields 0.23 per cent. strychnine and 0.08 per cent. brucine; in the leaves Hooper found 0.3 per cent. brucine, but no strychnine; the bark, according to Beckurts and Vilmar, contains 1.6 per cent. alkaloid (considering the alkaloids present in equal quantities), an examination of the residue disclosed that the bark contains brucine with only traces of strychnine.

The seeds of *S. potatorum*, L. fil., according to Flückiger and Maisch, contain neither brucine nor strychnine; but according to the authors of the *Pharmacographia indica* they contain brucine, but no strychnine; according to Beckurts and Peinemann there is neither alkaloid present, confirming the first-mentioned investigators.—*Arch. der Pharm.*, 1892, 549.

*Amyloid*.—A constituent of milk and dairy products. Dr. F. J. Herz, in a microscopic examination of milk, cream, cheese of various kinds, and even in what is called chemically pure casein, found structures which in appearance, size and behavior to iodine showed striking similarity to starch. A point of difference was found in the action of boiling water, which failed to gelatinize them; heated they become soft and can be enveloped by casein or gluten, but without forming an intimate mixture, as iodine will sharply define the position of this substance, called "amyloid." It has not been determined if it is a constant constituent of milk nor if it has any bearing upon the use of the milk.—*Chemiker Ztg.*, 1892, 1594.

*The Oxidation and Saponification of Mineral Oils*.—By the joint action of sulphuric acid and atmospheric oxygen, the naphthene hydrocarbons undergo a partial oxidation, since the resinous or bituminous constituents obtained are found by analysis to be oxygenated and the practical utilization of the products substantiate this. The solid constituents (bitumen) in crude oil are undoubtedly produced in the interior of the earth by oxidation under pressure, and the products at least partially enter solution in the crude oil. It appears that the presence of natural oxidation products greatly

increases the tendency of the mineral oils to oxidize when treated with sulphuric acid and oxidizing agents, therefore in practice it is best to take the fractions obtained by treating the naphtha residues with superheated steam. Taking the mixed fractions having a specific gravity of about 0.900 and heating them with sulphuric acid and manganese dioxide while air is forced through under pressure, there will result a product of which, when purified by distilling with water in vacuo, 60–80 per cent. is directly saponifiable with alkalis. The product through exposure to air loses to a considerable extent the property of saponification; increase of temperature in the saponification also brings about changes in the oils and causes them to separate from combination. A soap made by observing proper precautions was found to be as valuable as any soap made from vegetable or animal fats.—R. Haack, *Chemiker Ztg.*, 1892, 1598.

*Arnica montana*.—An analysis of the flowers disclosed the presence of fat, composed of the glycerides of lauric and palmitic acids with a hydrocarbon (0.1 per cent.) of the marsh gas series, obtainable from the solution in acetone as pearly scales, melting at 60° C.; malic acid and dextrose are also present in the flowers; but the important constituent appears to be *arnucin*  $C_{12}H_{22}O_2$ , present to the extent of 4 per cent., and obtainable from a concentrated acetone, solution as a microcrystalline mass, deliquescent after prolonged exposure; it melts at 40° and boils at 83° C.; in larger quantities it appears of a red yellow color; in thin layers it is golden yellow; it is easily soluble in ether, alcohol, acetone, benzole, and is insoluble in water and alkalis.—B. Börner (*Apoth. Ztg.*) *Pharm. Centralhalle*, 1892, 638.

*Mercurial Ointment*.—A recommendation by H. Borntraeger, according to which it is possible to make an ointment containing 98 per cent. metallic mercury, consists in triturating the mercury with oleate of mercury; the ointment of this strength is suitable for preparing the officinal ointment by diluting with lard. It is also considered feasible to change the liquid character of mercury to that of a solid with the aid of a little oleate of mercury and thus avoid the shipment of a troublesome liquid; after transportation ether will extract the oleate, leaving the mercury again in the liquid state.—*Pharm. Post*, 1892, 1245.

*Benzoic acid made from the resin* can be distinguished from the



acid of other sources by adding resorcin and concentrated sulphuric acid to the alcoholic solution of the acid, when a beautiful red coloration is produced. This reaction, known as a test for aldehydes, would indicate the presence of an aldehyde (very probably vanillin) in the benzoic acid from the resin.—M. Göldner, *Pharm. Ztg.*, 1892, 697.

*Antichlorin of Klebs.*—Professor Klebs reasoning that every organism during its life-time produced substances which if allowed to accumulate would result in the death of such organism (in the case of man and animals these products are carbonic oxide, bile, urine, etc.) has realized success in the treatment of tuberculosis by a preparation, "*tuberculocidin*," made from the cultures of the tuberculosis bacillus (Am. Jour. Pharm., 1891, 599); the failure of Koch's *tuberculin* is explainable by the presence of products which have specific toxic action upon man along with the products which are destructive to the bacilli; by removing the former substances (called alkaloids) a preparation is obtained not injurious to man, but fatal to the bacilli. *Anticholerin* is a preparation in which these reasonings are applied in the purification of an extract from the culture of the comma bacillus, and which has given very encouraging results in the treatment of cholera in a Hamburg hospital; while only the most serious cases were treated with it, the number of fatal cases was 16–17 per cent. less than was the case with other treatment. The preparation is a clear, brown-yellow viscid liquid having an odor reminding of cholera patients; it is injected into muscular tissue of the stomach, or into the subcutaneous tissue of the thigh.—Dr. Manchot (*D. Med. Wochenschr.*) *Pharm. Ztg.*, 1892, 719.

## ABSTRACTS FROM THE FRENCH JOURNALS.—

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*Iodine trichloride* is highly recommended by Dr. Pflueger of Bern as an antiseptic in various affections of the eye (*Ann. d'Oculistique*, Sept., 1892). In solutions of 1:2000 it kills within one minute the *Staphylococcus aureus*, and in from one to five minutes various cultures from pus and malignant ulcers. For subconjunctival injections the new medicament was used of the strength of 1:1500, and as an application in different diseases of the eye solutions containing from 0.1 to 1 per cent. were employed.

*Unguentum Potassii iodidi*, free from crystalline particles, is best obtained by using a solution of definite strength of the salt in glycerin instead of in water. According to *Jour. de Phar. d'Anvers*, June, 1892, such a solution keeps for an indefinite length of time. This practical method was first recommended by the *Bulletin de Pharmacie du Nord*.

*Strontium bromide* has been found useful by Dr. Coronedi (*Rép. de Phar.*, Octbr., 1892) in persistent vomiting originating from various causes. Given in two or three daily doses of 1 gm. after meals, its good effects are observed more or less rapidly, even in obstinate vomiting of pregnancy.

*Lithium benzoate in rheumatic gout*.—Adone (*Jour. de Phar. et de Chim.*, Octbr. 1, 1892) confirms the experience of Ure and Keller, that under the influence of benzoic treatment the conversion of uric acid into benzoic acid may be effected. The best effects were produced by the prolonged use of lithium benzoate, the conversion becoming so complete that the murexide reaction was no longer observable.

*Crayons of zinc chloride*.—Dumontpallier (*Rev. invent. techn.* through *Monit. pharm.*, 1892, 1119) takes 20 gm. of zinc chloride in very fine powder, adds to it drop by drop sufficient water to make a mixture of syrupy consistency and then incorporates with it in small quantities 40 gm. of rye flour. The mass is then divided into quantities of 4 gm. each, which are rolled out to the thickness of 5 mm. and to 15 cm. in length. The crayons are then heated to 50° C. to give them a certain hardness and elasticity. They are kept in sterilized lycodium.

*The efflorescence of crystallized sulphates*, like those of zinc, cobalt and iron, according to A. Baubigny and E. Péchard (*Compt. rend.*, cxv, 171), is very materially hastened through the presence of small quantities of uncombined acid.

*Decomposition of bismuth subnitrate by water*.—On heating this bismuth salt,  $(\text{Bi}_2\text{O}_3)_2\text{N}_2\text{O}_5$ , with water to 200° C. for about 90 hours, G. Rousseau and G. Tite (*Compt. rend.*, cxv, 174) obtained the oxide  $\text{B}_2\text{O}_3$  in crystalline condition.

*Bismuth subnitrate in infantile diarrhœa*.—Dr. Zinnès (*Rev. Thérapeut.*, 1892, 501) uses the following prescriptions in cases of greenish infantile diarrhœa where the stool contains numerous pieces of casein and where it is attended with more or less violent abdominal



pains. Fennel water 75·00, bismuth subnitrate 3·00; lime water 6·00; syrup of bitter orange 15·00. Give a teaspoonful every two hours. In cases which resist this treatment the author uses the following: An infusion of columbo, 0·5 or 1 gm. to 75 gm. water; subnitrate of bismuth 3 gm.; syrup of bitter orange 15 gm. Give one or two teaspoonfuls every two hours.

*Clarification by milk.*—Tannin solutions, acid and alcoholic, particularly if containing a rather large proportion of alcohol, are readily clarified by Foulon (*Jour. de Phar. et de Chim*, Septb., 1892) on the addition of from 3 to 5 gm. of milk to the litre of liquid. By this means the preparation of vinous syrup of cinchona is greatly facilitated, the syrup being very limpid and retaining its clearness for a long time.

*Action of formaldehyde on coloring matters.*—Trillat observed (*Bull. de l'Assoc. des Chim. de sucrerie et dist.*, July, 1892) that this compound (formol) removes the natural red color of wine, a compound with tannin being formed, while the decoloration of wines artificially colored is usually incomplete; rosaniline, for instance, assumes by this treatment a characteristic violet blue color. Formol may therefore be employed for recognizing the presence of foreign coloring matters in wine; and it is also of service in the estimation of sugar in natural wine, since the decoloration produced does away with the treatment with animal charcoal.

*Tincture of Rhus radicans* is prepared by macerating one part of the dry leaves in five parts (by weight) of alcohol of 21 per cent. for two weeks, expressing and filtering. This tincture has been used by Dr. Saint-Philippe of Bordeaux with good success in nocturnal incontinence of urine, a cure having been effected in one-third of the cases treated, the remaining ones being improved. The dose is five drops morning and evening for children from 2 to 6 years, and for the latter age may be gradually increased to 40 drops. The medicine is readily tolerated, producing only mild dypnœa and slight vertigo in certain children. The author adds that the quality of the medicament should be investigated in case favorable results be not obtained.—*Four. Mid. Chir. prat.*, 1892, 761.

*Drimys chilensis.*—Otto Witte has obtained from the bark of this plant a volatile oil, belonging to the group of terpenes, also a crystalline substance, apparently a camphor.—*Boletín de Med. de Santiago; Rev. internat. de Bibliog. méd.*, 1892, p. 984.

*Laurelia aromatica* —Otto Witte (*loc cit.*) isolated from the bark of this Chilean tree an alkaloid which he named *laureline*. Its reactions are similar to those described by Zeyer for atherospermine (see *Amer. Jour. Phar.*, 1862, p. 166), and it resembles also the boldine of Bourgoin and Verne (*ibid*, 1872, p. 560). The plants from which these alkaloids have been obtained belong to the order Monimiaceæ, and it seems probable that the three alkaloids are closely related.

*Preparation of salicylate of eserine.*—According to *Nederlandsch Tijdschrift (L'Union Pharma.*, 1892, 401) 100 parts of eserine sulphate are dissolved in a sufficient quantity of water and precipitated by an excess of sodium carbonate. This mixture is shaken repeatedly with water and ether (free from alcohol). The ethereal liquids are united and filtered into a beaker containing 35.5 parts salicylic acid by which the salicylate of eserine is precipitated. This is collected on a filter washed with ether and then dried at ordinary temperature away from air and light. Thus obtained the salicylate is in very small crystals and is rather voluminous.

*Cascarin*,  $C_{12}H_{10}O_5$ , is a crystalline principle isolated by Leprince from the bark of *Rhamnus Purshiana*. The bark is treated with a hot solution of soda, the infusion neutralized with sulphuric acid and the filtrate concentrated in vacuo; the precipitate is redissolved in hot soda solution, and this is rendered slightly acid; the residue left on evaporation is dried, treated with acetone, the liquid acidulated with sulphuric acid and poured into a large quantity of boiling water. The precipitate, after further purification, forms prisms, which have a more or less deep yellow color, depending upon the amount of water in combination. On fusion with potassium hydrate, phenol is produced.—*Compt. rend.*, cxv, 286.

*Urechites suberecta*.—The leaves of this apocynaceous plant, which is indigenous to Jamaica, according to Stockman (*Rev. de Clin. et de Thér.*, June 29, 1892) contains an alkaloid, *urechitine*, and a glucoside, *urechotonin*, resembling digitalis in its action. The alkaloid is toxic, producing emesis, muscular weakness and arrhythmia and lessening of the heart beats. The glucoside has nearly the same properties, but is less toxic.

*Morrenia brachystephana*, an asclepiadaceous plant of the Argentine Republic, known as *tasi*, is an excellent galactagogue, according to Del Arca and Sicardi (*Semaine méd.*, July, 1892). An

infusion is prepared of the leaves or root, 50 gm., to water 200 gm.; or a decoction of 40 gm. of the fruit. The medicine is taken by the wet-nurses during the day in tablespoonful doses.

*Injections of pyoktanin.*—Drs. Petterute and G. Mirto report (*Rif. med.*; *Nouv. Remèdes*, 1892, 479) (1) that injections of pyoktanin (1 : 500) into the pulmonary cavity of phthisical patients do not give rise to troubles but are well tolerated; (2) that these injections lower the temperature in hectic fever; (3) that during this treatment the bacilli do not appear in the spittle; (4) that, should the injection penetrate into the bronchia it will act in a destructive manner on the epithelium of the lining, the spittle containing flakes of mucous and numerous epithelial cells; this accompanied by an irritating and refractory cough; (5) that pyoktanin blue or its decomposition products irritate the renal epithelia and may cause an acute nephritis.

*Elimination of creasote.*—Creasote, in whatever form administered, according to Dr. Imbert (*Bull. gén. de Thér.*, Sept., 1862), is chiefly eliminated through the kidneys, the greatest part being found in the urine during the first twelve hours, while the quantity expectorated is insignificant.

*Asbolin*, a preparation obtained by Braconnot from the aqueous infusion of soot, and which has been used to some extent as a remedial agent in phthisis, has been examined by Béhal and Desvignes (*Campt. rend.*, cxiv, 1541) and found to be a mixture of *pyrocatechin* and *homopyrocatechin*. The former melts at 104° and boils at 240° C., and the latter at 51° and 251° C., respectively. This is identical with the homopyrocatechin from creosol, which was formerly known only as a syrupy liquid, but was prepared by the authors in the solid state.

*Crude petroleum* has been used by Dr. Larcher in diphtheritis in the form of gargle and of protective covering (badigeonnage). The author's conclusions are that crude petroleum is a good agent and frequently successful in the disease, and that its use causes no inconvenience. With 42 patients the treatment varied from 8 to 18 days, and no cases of contagion were observed.

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**Sparteine**, heated to about 180° C. in a sealed tube with excess of silver oxide and water, according to A. Peratoner, is decomposed into carbonic acid and pyridine.—*Gazz. chim.*, XXII.

STAINING VEGETABLE TISSUES.<sup>1</sup>

It is found in practice that sections prepared for microscopical examination become much more intelligible, even to experienced workers, if they are suitably stained. By this is meant a process of differentiation of the tissue systems, based upon the employment of various dyestuffs. In many instances, too, the recognition of certain cell-contents is rendered more certain. Squire divides such coloring agents into nuclear, plasmatic and specific stains. The first-named are of value in proportion as they exhibit a selective affinity for the substance of nuclei, whilst leaving the ground substance comparatively uncolored. Such stains are, of course, only needed in dealing with fresh tissues, and there is little doubt that hæmatoxylin is the best for the purpose. There are many different formulas for its preparation, but it is both difficult and tedious to prepare satisfactorily by most of them. The formula for Ehrlich's ammoniated hæmatoxylin is free from these objections. Hæmatoxylin, 2 grammes, and ammonium carbonate, 0.4 gramme, are dissolved in proof spirit, 40 cc., and exposed to the air in a shallow dish for twenty-four hours. The volume is then made up to 40 cc. with proof spirit, which is warmed, if necessary, to dissolve any separated crystals. Ammonia alum, 2 grammes, dissolved in distilled water, 80 cc., is then added; together with glycerin, 100 cc., rectified spirit, 80 cc., glacial acetic acid, 10 cc. ("Methods and Formulæ," p. 24.) The solution is ready to be diluted for use straightway and does not deteriorate by keeping. Sections when stained with it are of a violet color, but this may readily be changed to blue by washing in an aqueous solution of sodium bicarbonate ( $\frac{1}{2}$  grain in 1 oz.). As soon as the color is satisfactory the sections should be transferred to 70 per cent. alcohol; for, if kept in water, the color is apt to fade. Over-staining may be remedied by the addition of one-tenth to half per cent. of strong hydrochloric acid to the alcohol and subsequent washing with the sodium bicarbonate solution already mentioned. Carmine answers the same purpose as hæmatoxylin, and may be used as an alternative, but does not leave nuclei so sharply defined. A useful preparation of it is Grenacher's alcoholic borax carmine, made by dissolving borax, 4 grammes, in distilled water, 100 cc., adding carmine, 3 grammes, and heating gently;

<sup>1</sup> Pharm. Journal and Transactions, Novbr. 19, 1892, p. 401.



100 cc. of 70 per cent. alcohol is then added, and the solution filtered if necessary before use. The sections, after staining, are transferred to alcohol (70 per cent.), containing half to one per cent. of hydrochloric acid (sp. gr. 1.16). *Plasmatic stains* color the tissue uniformly and are used to color the ground for the sake of contrast, when nuclear and specific stains have been previously used. Alcohol must be removed from the sections by placing them for a minute in distilled water, after which they may be transferred to the plasmatic stain. To follow hæmatoxylin this may be water soluble eosin (1 grm. in 40 cc. of s.v.r., and 160 cc. aq. dest.), erythrosin (same strength as eosin), or orange (2 grm. in 20 cc. of s.v.r., and 80 cc. aq. dest.). After using carmine, picric acid (1 grm. in 100 cc. of 70 per cent. alcohol) affords a suitable contrast. In each instance afterwards wash with 90 per cent. alcohol. *Specific stains*, as their name implies, are used to distinguish certain elements only from the mass of tissue. Carmine, hæmatoxylin and most of the aniline dyes stain unaltered cellulose, whilst lignified tissue may be permanently stained with methyl green (0.25 grm. in 20 cc. of s.v.r., and 80 cc. aq. dest.). Squire's process for double staining stem and root sections containing cellulose and lignified tissue is to first rinse in distilled water, then place in methyl green solution for three or four minutes; again rinse in water, wash in 90 per cent. alcohol for five or ten minutes, place in Grenacher's alcoholic borax carmine for fifteen or twenty minutes, rinse quickly in water, and pass through 90 per cent. alcohol. Chlorzinc iodine<sup>1</sup> colors cellulose blue, and lignin yellow or yellowish brown, the latter being also colored red with phoroglucin (1 grm. in 20 cc. s.v.r., and 80 cc. aq. dest.) and strong hydrochloric acid, and yellow with aniline chloride (2 grm. in 65 cc. of s.v.r., 35 cc. aq. dest., and 2 cc. strong HCl). Hoffmann's blue or eosin are specially useful for distinguishing sieve areas. Particulars of other specific stains and their uses may be found in Poulsen's "Botanical Micro-Chemistry." For permanent preparations of fresh vegetable tissues hæmatoxylin will be found the most useful single stain, since by controlling its action it is quite possible to differentiate all the constituents with it, each one displaying a distinct shade of blue, marking it off clearly from the

<sup>1</sup> Schulze's solution: prepared by evaporating 100 cc. liq. zinci chlor., B.P. to 70 cc., and dissolving in it 10 grammes potassium iodide. Add 0.2 gramme iodine, and shake frequently until saturated. ("Methods and Formulæ," p. 55.)

rest. The best results in double staining or in dealing with dark colored drug sections, etc., can only be obtained by first bleaching (*Pharm. Journ.*, **3**, xxii, 869), and then carefully removing all traces of the bleaching agent before applying the stains. In this case, of course, all cell contents are of necessity destroyed, and removed during the process of washing.

## NOTE ON SANDAL-WOOD AND CEDAR OILS.

By R. A. CRIPPS, F.I.C.

The samples which form the subject of this note are as follows :

Nos. 1, 2 and 3.—Obtained as “English,” from houses of repute ; price and other considerations give me no reason to doubt their purity.

No. 4.—Macassar oil.

No. 5.—A sample for which I am indebted to Mr. R. Wright. It is about seventeen years old, cannot be guaranteed as “English,” but was obtained as such.

No. 6.—West Indian oil.

Nos. 7 and 8.—West Australian samples from two different dealers.

Nos. 9 to 12.—Cedar-wood oil from several houses of repute.

The results which I have obtained are classified in the following tables, the tests being applied as described in a former note on “Oil of Rosemary” (see *Pharm. Journ.* [3], xxi, p. 937),<sup>1</sup> with the exception that I now use a 5 per cent. solution of ferric chloride for that test, which I find usually gives clearer reactions.

To this series I have also added the saponification test, which is carried out as follows: About 5 grammes of the sample is accurately weighed into an Erlenmeyer flask, 10 cc. of an approximately semi-normal alcoholic solution of caustic potash added, and the whole boiled under a return condenser for half an hour. Side by side with this another experiment is conducted as a blank, using

<sup>1</sup> For two drops of the oil 6 drops of nitric acid were used ; or 4 drops of sulphuric acid ; or sufficient of a 5 per cent. solution of bromine in chloroform to produce a faint yellow color ; in the latter case, the mixture is set aside for several hours. Five drops of the oil mixed with 1 cc. HCl, heat to ebullition, add 4 cc. chloroform, set aside and observe the color of the two layers. Four drops of the oil, 4 drops of ferric chloride solution and 10 drops of H<sub>2</sub>SO<sub>4</sub> ; after 30 seconds add 5 cc. CS<sub>2</sub>, agitate and pour into a white dish.



only the potash solution. After the boiling, the remaining alkali is determined by titration with decinormal hydrochloric acid, using phenolphthalein as indicator, the difference between the amount required in the two experiments being due to the alkali combined with the oil.

A study of the tables will indicate certain distinctive features in the various kinds of oils examined.

TABLE I.—COLOR REACTIONS.

Number of Sample.	Nitric Acid 1'5.	Sulphuric Acid 1'843.	Bromine and Chloroform.	HCl and Chloroform.	Ferric Chloride.
1.	Yellow, to reddish brown.	Yellow to clear red-brown; steadily darkening.	Pale orange tint, becoming red.	<i>Acid.</i> —Colorless. <i>Chlorof.</i> — Yellowish.	Indigo, to greenish-black; slowly fading.
2.	The same.	The same.	Brown, with reddish tint.	—	Brown - violet changing to brownish black, and slowly fading.
3.	The same.	The same.	The same.	Like No. 1.	The same.
4.	Bright brown, with after tint of purple.	Yellowish-brown to deep brownish-red.	Pinkish, becoming brown.	<i>Acid.</i> —Pale yellow. <i>Chlorof.</i> —Dull pink.	Dark violet, fading to dull green.
5.	Rather darker tint than No. 1.	The same, but rather darker.	Bluish green, then green.	<i>Acid.</i> — Slightly yellow. <i>Chlorof.</i> — Yellow-brown, becoming paler with greenish tint.	Brownish - violet, then burnt sienna, fading slowly.
6.	Greenish, passing to indigo.	Bright orange, rapidly darkening, finally brownish-yellow.	Bluish violet, then indigo.	<i>Acid.</i> —Colorless. <i>Chlorof.</i> —Pinkish-violet, fading to yellow.	Pale blue to green, then fading to yellow.
7.	Red, passing to dark brown.	Orange-red, changing rapidly to dark brown.	Port wine color then claret.	<i>Acid.</i> — Colorless. <i>Chlorof.</i> —Yellow-brown, then greenish yellow.	Brown - violet, changing to brown and slowly fading.
8.	Orange-brown, to deep red-brown.	Orange-brown, to deep red-brown.	Brownish - violet, becoming deeper on standing.	<i>Acid.</i> —Dull yellow. <i>Chlorof.</i> —Pale greenish-gray to deep brownish green.	Deep violet-brown very slowly fading.
9.	Green at edges; salmon to orange in centre, finally indigo-green.	Orange, then red-brown.	Sherry color, with purplish tint, changing to brownish black, then brown.	<i>Acid.</i> — Pink. <i>Chlorof.</i> — Rose colored, fading to greenish yellow.	Violet, rapidly changing to yellow.
10.	Edges paler green; centre deeper orange, <i>not</i> changing to indigo.	Rather paler than No. 9.	The same.	<i>Acid.</i> — Pink. <i>Chlorof.</i> — Rose, fading to yellow.	Like No. 8.
11.	Brilliant green edges; orange-red centre, changing to pink.	Same as No. 8.	The same.	Like No. 9.	Like No. 8, but more intense.
12.	Slightly greenish edges; blood-red then intense purplish-brown.	Orange-red to red-brown, darker than No. 8.	The same.	Like No. 9.	Brown, with rose tint, rapidly changing to dirty yellow.

TABLE II.—PHYSICAL AND CHEMICAL TESTS.

Number of Sample.	Sp. Gravity.	Rotation in 200 mm. Column.	Spirit Test.	Bromine Absorbed. Per Cent.	KHO Required for Saponification. Per Cent.
1, . . . . .	976'5	— 37° 40'	No turbidity.	112'0	0'44
2, . . . . .	975'9	—	"	112'1	0'80
3, . . . . .	978'4	—	"	111'8	—
4, . . . . .	972	— 47°	8'0 cc.	130'0	0'63
5, . . . . .	963'0	+ 20°	5'7 cc.	149'7	2'17
6, . . . . .	967'5	+ 53°	8'4 cc.	109'0	0'42
7, . . . . .	952'0	+ 80° 50'	15'0 cc.	131'7	0'79
8, . . . . .	967'0	+ 25° 20'	3'05 cc.	123'8	—
9, . . . . .	950'0	+ 15° 50'	0'25 cc.	95'0	1'86
10, . . . . .	945'4	+ 5° 10'	0'40 cc.	126'3	0'98
11, . . . . .	967'4	+ 19° 40'	0'65 cc.	91'8	3'61
12, . . . . .	970'0	+ 80° 50'	2'20 cc.	121'2	1'05

(1) *Specific Gravity*.—In common with other observers, I find the sp. gr. of the genuine sandal-wood oil to be considerably higher than that of either cedar oil or the West Indian or West Australian oils, although cedar oil varies very much in this respect, one sample approaching that of the genuine oil.

(2) *Rotation of Polarized Light*.—True sandal-wood oil possesses a — rotation, whereas the West Indian and West Australian oils rotate to the right, and cedar oil usually so, although the sample with high sp. gr. is left-handed. This fact has also been already noted in Messrs. Schimmel's report for April, 1891.

(3) *Solubility in Spirit*.—By the "spirit test" a marked difference is observed, corresponding with the results published by Mr. E. M. Holmes, in the *Pharm. Journ.* [3], xvi, p. 822, all the varieties of sandal-wood oil being much more soluble than cedar oil. I find that the English distilled oil from East Indian sandal-wood dissolves readily in a mixture of 4 fluid parts of rectified spirit with 1 of distilled water, but the Macassar oil requires a large proportion of this mixture; this latter, however, forms a clear solution with five times its volume of a mixture of rectified spirit 5 fluid parts, distilled water 1 fluid part.

(4) *Bromine Absorbed*.—The bromine absorption gives no distinctive indications on account of the great variability of those of cedar oil; it may, however, be noted that the three new samples of the genuine oil exhibit a remarkable uniformity in this respect.

(5) *Saponification*.—The KHO required for saponification of cedar

oil is rather greater than for sandal-wood oil, but the difference is not sufficiently uniform to permit of its use as a means of detecting substitution or adulteration with the former.

(6) *Color Tests*.—Of the color reactions the most important are those with nitric acid, and hydrochloric acid and chloroform, the former giving a green tint with cedar oil and the latter a pink coloration in the acid layer, which are not produced by the different kinds of sandal-wood oil.

*Detection of Adulterants*.—With a view to detect the presence of cedar oil and also of castor oil in sandal-wood oil the following trials of the spirit test were made :

Sandal-wood oil No. 1 with 12 per cent. of cedar-wood oil No. 12 showed no appreciable difference from the pure oil.

Sandal-wood oil No. 1 with 14 per cent. of cedar-wood oil No. 12 required 14.5 cc. weak spirit.

Sandal-wood oil No. 1 with 18 per cent. of cedar-wood oil No. 12 required 11.8 cc. weak spirit.

Sandal-wood oil No. 1 with 41 per cent. of cedar-wood oil No. 12 required 5.0 cc. weak spirit.

Sandal-wood oil No. 1 with 5 per cent. of castor oil required 12.5 cc. weak spirit.

These results show that by the spirit test 5 per cent. of castor oil or 14 per cent. of the most soluble cedar oil can be detected in English (East Indian) sandal-wood oil ; had one of the less soluble samples been used a smaller proportion would have been rendered evident. I find, in fact, that 10 per cent. of sample No. 11 can be detected.

Sample No. 1 to which 5.2 per cent. of castor oil had been added required for saponification 1.45 per cent. of potassic hydrate, indicating 5.6 per cent. of the adulterant, if we take 18.0 per cent. as the percentage required by castor oil. For the application of this test, I should suggest that the amount of KHO required in excess of .10 per cent. should be multiplied by 5.5 to obtain the approximate amount of fatty oil ; thus allowing a fair margin for somewhat abnormal samples of sandal-wood oil.

*Sample No. 4*.—So far, I have not considered Sample 4 ; but its great age is alone sufficient to cause one to look suspiciously upon the results obtained. In odor it was distinctly different from either of the first three samples, and approached No. 10 (cedar) quite as

much as it did sandal-wood oil. It is evident that either the sample is not a genuine one at all, or long keeping has so modified its characters as to render it unlike the English oil.

*Conclusions.*—Finally, in the light of these results, and those obtained by other workers as referred to above, I would suggest that the official description of the characters and tests of sandal-wood oil should be modified as follows: "Thick in consistence, pale yellow or nearly colorless, possessing a strongly aromatic odor, a pungent and spicy flavor, and a neutral or slightly acid reaction. Its specific gravity should not be below .970. At 60° F. (15.5° C.) it forms a clear or at most a faintly opalescent solution with five times its volume of a mixture of five fluid parts of rectified spirit with one fluid part of distilled water. It rotates the plane of polarization of a ray of polarized light strongly to the left. Two drops of the oil added to six drops of nitric acid, sp. gr. 1.5 on a white tile should give a yellow to bright reddish-brown coloration, without any green, indigo, or violet tint at the edges during five minutes. For complete saponification in alcoholic solution, it requires not more than 1 per cent. of potassium hydrate." It is not improbable that further experience will show that these tests are not sufficiently restrictive, for although they would detect comparatively small additions of cedar-wood, copaiba, or castor oils, or turpentine, they would fail in the case of small quantities of West Australia or West Indian sandal-wood oils.

These experiments were conducted in the laboratories of Messrs. Southall Bros., and Barclay, to whom my thanks are due.—*Phar. Jour. and Trans.*, Dec. 10, 1892, p. 461.

## PODOPHYLLUM EMODI.<sup>1</sup>

BY JOHN C. UMNEY.

This Himalayan drug, which was the subject of a communication by Dymock and Hooper to the *Pharmaceutical Journal* ([3], xix, 585), has recently been imported in considerable quantity, possibly owing to the opinion there expressed of its richness in resin, which "produced unmistakable cathartic effects." The chief botanical characters of the rhizome have been described by those authors; and the quantity of resin determined by the official process for the

<sup>1</sup> From Yearbook of Pharmacy, 1892, p. 395.



preparation of podophyllum resin, found to be equivalent to 10 or 12 per cent.

The constituents of the resin have been examined by F. A. Thompson (*American Journal of Pharmacy*, vol. lxii, p. 245), who states that it contains more podophyllotoxin, to the extent of at least 25 per cent., than the resin of *P. peltatum*; and one would therefore expect it to be proportionately more active physiologically. As such did not appear to be the case on trial in several instances, it seemed desirable to make an extended examination of its constituents, following, if possible, the lines adopted by Podwissotzki in his examination of the resin of *P. peltatum*.

The recent suggestion of Professor Attfeld, in his "Pharmacopœia" revision report, that, subject to confirmation, this species should be included for the preparation of the resin in future editions of that work has made this detailed comparison of more importance.

The results of Podwissotzki's work on the resin of *P. peltatum* may be briefly summarized, thus:

The physiologically active portion of podophyllum resin consists of podophyllotoxin, which is composed of picropodophyllin, held in solution by picropodophyllic acid.

Picropodophyllin is a neutral crystalline principle, which, though the sole active ingredient of the resin, is inactive in its free state, owing to its insolubility, but in combination with, or more probably solution in, picropodophyllic acid, is extremely active. The resin also contains an inactive acid—podophyllic acid, a yellow coloring matter—podophylloquercetin and fatty matter.

*Extraction of the Resin.*—The powdered rhizome was treated exactly in the manner described in the official process for the preparation of podophyllin resin, and was found to yield 11.4 per cent. of a pale lemon-yellow resin.

The solution from which the resin had been precipitated was markedly sweet in taste, and reduced Fehling's solution powerfully without inversion. It was found after concentration to possess no purgative action whatever, and was not further examined.

*Separation of Constituents of Resin—Podophyllotoxin.*—Ten grammes of the crude resin were exhausted by dry chloroform, free from alcohol, the bulk of the chloroform removed by distillation, and the residue poured into a large quantity of dry ether. The portion insoluble in ether was at first pasty, but afterwards became



dry and brittle. (This substance is distinctly acid, and is described by Thompson as podophyllotoxin, but corresponds to the inert podophyllic acid obtained from *P. peltatum* by Podwissotzki.) The ether-chloroform solution was then filtered into a large volume of petroleum ether, when the podophyllotoxin was precipitated. This, when collected, washed and dried over sulphuric acid, was found to be equivalent to 17.8 per cent. It was readily soluble in chloroform, gave no precipitate with ether, indicating complete removal of podophyllic acid, but gave a deep green coloration with ferric chloride. This reaction pointed to the presence as an impurity of a body similar to that described by Podwissotzki and named by him podophylloquercetin, which will be described subsequently.

Podophyllotoxin is not soluble in solution of ammonia, but on heating with it is decomposed, forming a gelatinous precipitate and a frothy solution. The solution in ammonia when shaken with ether and the ether evaporated, yielded abundant groups of long white needles of picropodophyllin.

*Picropodophyllin*.—Ten grammes of the crude resin were exhausted with cold chloroform and the solution evaporated to dryness. This was extracted with boiling petroleum ether and the residue dissolved in rectified spirit, mixed with lime and dried on a water-bath and finally exhausted with boiling absolute alcohol. The solution on evaporation and addition of water yielded an abundance of silky, needle-shaped crystals. These melted after re-crystallization at 208–210° C., and are undoubtedly identical with the crystalline substance obtained by Podwissotzki from *P. peltatum* which melted at 200–210° C.

The quantity obtained was small, amounting to 2.6 per cent. of the resin, although a slightly larger percentage was obtained by a direct treatment of the rhizome as recommended by Podwissotzki.

*Picropodophyllic acid* was obtained by treatment of the crude podophyllotoxin in solution in alcohol with ammonia, removing the picropodophyllin with ether and then liberating the acid from its ammonium salt by dilute hydrochloric acid. Considerable difficulty was experienced in purifying the acid owing to the readiness with which it is decomposed, and the impossibility of freeing it entirely from picropodophyllin. It is resinous in character and agrees closely in general properties with the similar body obtained from *Podophyllum peltatum*.

*Podophyllic acid* was precipitated from the chloroformic solution by ether (as mentioned already under the heading of podophyllotoxin) in quantity equivalent to 30·8 per cent. It was thrown out in white flocks which rapidly aggregated forming a brown resinous mass, but which after drying was easily reduced to a pale grayish powder. It was distinctly acid to litmus and melted at about 125° C. It was soluble in chloroform and alcohol, but insoluble in ether and water. It possessed when free from picropodophyllin no cathartic action whatever, and hence the description of this ether precipitate by Thompson as podophyllotoxin, the name applied by Podwissotzki to the active ingredient of the resin, has led to misconception. It was found necessary to remove the precipitate of podophyllic acid at once from the ether and chloroform solution, as its precipitation causes the crystallization of a part of the picropodophyllin, and may lead to a considerable loss of that body.

*Podophylloquercetin*.—The crude resin after extraction with petroleum ether and dry alcohol-free chloroform was dried and extracted with ether, the ethereal solution concentrated and precipitated as a bright orange powder by alcoholic solution of lead acetate. The lead compound was decomposed by sulphuretted hydrogen and the liberated podophylloquercetin shaken out with ether. It was crystallized by the addition of benzole to the ethereal solution, and was purified by sublimation. The crystals, which became green on exposure to air melted at 248° C., with slight decomposition. The amount obtained was equivalent to 1·35 per cent. of the resin.

*Fatty Matter*.—Petroleum ether removed from the crude resin 2·3 per cent. of a greenish fat, which differed from that obtained from the resin of *P. peltatum* in being non-crystalline and semi-fluid, whilst that from the latter exists in larger quantity, and is distinctly crystalline in character.

Podwissotzki, in his examination of the resin of *P. peltatum*, makes no mention of the proportions of the various bodies separated therefrom, and on this account experiments under similar conditions have been made upon a sample of the resin from the rhizome of this species to determine its relative composition.

	P. Emodi.	P. peltatum.
Resin by official process for podophyllin		
resin, . . . . .	11·4 p.c.	5·9 p.c.
Constituents of the resin—		
Podophyllotoxin (crude), . . . . .	17·8	33·8

	<i>P. Emodi.</i>	<i>P. peltatum.</i>
Pure crystalline picropodophyllin, . . .	2'6	4'5
Picropodophyllic acid, . . . . .	not determined.	not determined.
Podophyllic acid, . . . . .	30'8	6'9
Podophylloquercetin, . . . . .	1'3	2'4
Fatty matter, . . . . .	2'3	5'7

The supposition of Podwissotzki that the activity of resin of podophyllin is dependent on the amount of picropodophyllin which it contains in solution in picropodophyllic acid, receives confirmation from the above figures, which show that the resin from *P. Emodi* yields a considerably smaller proportion of crystalline picropodophyllin than *P. peltatum*. The near relationship of the roots is evidenced by the close agreement in character of their several constituents, but the value of *Podophyllum Emodi*, dependent on the larger quantity of resin present in it, is counter-balanced by the smaller proportion of the active ingredient present in that resin. Briefly to summarize, the rhizome of *Podophyllum Emodi* yields nearly double the amount of resin yielded by *P. peltatum*, but that resin contained only about half the quantity of crystalline picropodophyllin to which the value as a cathartic is due.

Hence it is undesirable that *P. Emodi* should be employed as an alternative source for the preparation, according to the official process, of podophyllin resin.

ADDITIONAL NOTES.—At the meeting of the British Pharmaceutical Conference, where the above paper was read, Mr. Moss stated that, like Mr. Umney, he had obtained a larger proportion of resin from the Himalayan drug than from *Podophyllum peltatum*, but that its action was most capricious. In a communication to the Pharmaceutical Journal, November 26, Mr. Umney states that eleven males, varying in age from 18 to 55 years, took doses of half a grain, without any marked cathartic action (except in one instance) being observed. He further remarks that "The experiments of Thompson cannot be taken into comparison with results which I have obtained, as he applies the name podophyllotoxin to the substance precipitated by ether, whereas Podwissotzki classifies it as inert podophyllic acid."

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**Calcium oxalate**, met with in the bark of many trees, according to G. Kraus, must be regarded as a reserve deposit, which is dissolved and utilized by the plant in spring and summer.—*Ann. agron.*, XVIII.

ANGOPHORA KINO.<sup>1</sup>

BY J. H. MAIDEN, F.C.S., F.L.S.

The importance of the genus *Eucalyptus* and the almost universal occurrence of kino in these trees has thrown the subject of kino in the closely related genus *Angophora* almost entirely into the shade. Although some species are very common and yield it abundantly, a prejudice might arise against *Angophora* kinos being officially recognized as substitutes for that of *Pterocarpus*, partly because an odor is inadmissible in this substance. If a use should be found for them, I believe the kinos of any of the species may be mixed without detriment, as they appear to have practically the same composition when gathered under similar circumstances.

Angophoras are confined to the east coast of Australia; they are five in number, four of them being found in New South Wales, while one *A. Woodsiana* is peculiar to Queensland. *A. cordifolia* is peculiar to New South Wales; *A. intermedia* has the widest range, extending from Victoria to Queensland. *A. lanceolata* and *A. subvelutina* are found in Queensland as well as in New South Wales. They are well known as "apple trees" (although some species have other names in addition).

The timber yielded by various species of *Angophora* is often much deteriorated by "gum-veins" consisting of kino, which is usually disposed in thin concentric circles, but also in pockets. It is, nevertheless, useful for wheelwrights' purposes and for fuel.

*Angophora cordifolia*, Cav., is a coast district tall shrub; I have not observed kino on it.

*Angophora subvelutina*, F.v.M. This is a fair-sized tree; kino has likewise not been recorded from this species, but this is doubtless because attention has not been drawn to the matter.

*Angophora Woodsiana*, Bail. (Syn. Queensland Flora, Bailey): "Often containing large quantities of liquid red gum (kino), in hollows of the timber like the bloodwood (*Eucalyptus corymbosa*, Sm.)" (Bailey); used by the settlers as a remedy in diarrhœa, according to Dr. J. Bancroft.

*Angophora intermedia*, D.C. This is the species (and also *A. lanceolata* to a less extent) which yields a watery, slightly astringent

<sup>1</sup> From Vol. VI (2d Series) of the "Proceedings of the Linnæan Society of New South Wales;" reprinted from *The Pharmaceutical Journal of Australasia*, July 27, 1892.



liquid when the trunk (particularly at swellings) is tapped. I have described this substance under the name of "liquid kino" in a paper, *Proc. R. S. Victoria*, 1889, p. 82. It is sometimes known as "cider," and it is worthy of note that some country people call all liquids obtained from our native trees "cider" whether they are drinkable or not.

*A. intermedia* forms a fine tree, perhaps the handsomest of the genus. The bark is fibrous, hence the kino gets entangled in it and is frequently wasted. I describe four specimens of its kino, illustrating the variability of its appearance and composition.

(1) From Colombo (Lyttelton), near Candelo, New South Wales, gathered in June. Height of tree 30–50 feet, diam. 2–4 feet.

This kino had evidently exuded some time when collected. It is of a reddish-brown color, and of a brittle nature. From this circumstance, the small masses in which it is obtained speedily lose their bright, fresh appearance, assuming a color very much like that of ordinary dried currants. It forms a dull-looking powder of a pinkish-brown color. Cold water acts slowly upon it, forming an orange-brown solution which may readily be decanted. The abundant residue (mainly consisting of catechin) crumbles, forming a compact sediment of an Indian-red color, and containing a quantity of woody matter. It is exceedingly tedious to extract the last portions of soluble matter. Except in regard to tints of filtrate and residue, all *Angophora* kinos behave in the way just described when treated with water, and yield, when treated with alcohol, a turbid liquid and a filtrate of an orange-brown color.

(2) Bangle Creek, near Cambewarra, collected in March, from trees in diam. 1–2 feet.

This is obviously a fresher sample than *A. intermedia* No. 1. It is so like *A. lanceolata* No. 2 as scarcely to be distinguished from it in bulk. In water its behavior is similar to that of the preceding sample, but the solution is of a pale orange color.

(3) A second sample from Bangle Creek, Cambewarra, collected in April from trees, height 60–80 feet, diam. 1–3 feet.

It is a very clean sample, is neither perfectly new nor very old, is in smallish pieces, and of a garnet color. On account of its friability, it can be reduced to a light orange powder between the fingers without much difficulty. The kino in bulk has a slightly dulled appearance, although individual fragments break with a bright fracture.



(4) From Eastwood, near Sydney, collected in April from trees, height 80 feet, diam. 2 feet.

This sample much resembles No. 2. It is, however, decidedly darker in bulk, even inclining to liver-color, and is somewhat opaque. It readily crushes between the fingers to a burnt sienna powder, slightly darker than the standard tint. It is evidently the oldest of the *A. intermedia* samples. To water it yields a rich orange-brown liquid when filtered. With alcohol the filtrate is of a dark orange-brown.

*Angophora lanceolata*, Cav., "Red Gum," "Orange Gum," "Rusty Gum."

In collecting kino from this tree it may be well to remind people that the smooth trunk might be mistaken by a careless observer for that of *Eucalyptus maculata*, but the two kinos cannot be confused even by a tyro. I submit notes on two kinos of this species. This kino is abundant, and readily gathered on account of the smoothness of the bark. The tree obtains its vernacular names owing to the kino stains on the pale colored stem.

(1) From Botany, near Sydney, collected in March, trees 50 feet high, and 1-2 feet in diameter. When freshly gathered this kino has a smell somewhat like sour wine, something resembling that of *E. maculata* but not so agreeable. As far as my experience goes it is quite characteristic. The two kinos possess other characteristics in common, one of which is the following: If they be digested in water, and the turbid liquor be treated with ether, two ethereal layers are formed, containing catechin in solution. This substance may readily be obtained by evaporation of the ether, and it possesses the characteristic odor of the kino from which it was obtained, the residue, insoluble in ether, being quite destitute of odor. The odoriferous principle (a volatile substance allied to cinnamene or styrol) is, however, so small that an hour's exposure of the ethereal extract to the atmosphere removes every trace of it.

The present sample had freshly exuded, is exceedingly brittle, has a bright fracture, ruby with a tinge of brown; color of powder orange-brown. So brittle is it that the lumps and vessels containing it become readily coated with fine powder.

In cold water it dissolves slowly, forming a liquid of the color of brown sherry if left undisturbed. With alcohol it yields a pale orange-brown solution with a slightly muddy residue.

(2) The Valley, Blue Mountains, N.S.W., collected in April, height 80-150 feet, diam. 1-2 feet.

The description of No. 1 will apply here with the following exceptions: In bulk it is hardly so red as No. 1, while its powder is of a dark buff color. To cold water it behaves in the same way as No. 1; it is, however, less turbid and lighter in color. With alcohol it yields a pale orange-brown solution.

## RECENT WORK IN THE SUGAR GROUP.<sup>1</sup>

The carbohydrates of the sugar group and the compounds related to them have formed the subject of a great deal of the recent work of Professor Emil Fischer and many other workers, and in view of the frequent publication of fresh results, it is desirable to give a concise account of the more important portions of the work that has hitherto been done.

In the first place, the nomenclature of the group, which was before obscure and unsystematic, has been greatly altered and extended. Sugars which are simple derivatives of hydrocarbons have names ending in -ose, the number of carbon atoms in the molecule being indicated by the prefix, as pentose,  $C_5H_{10}O_5$ , hexose,  $C_6H_{12}O_6$ , etc.; the source of the sugar may be indicated by a further prefix, as glucoheptose, manno-nonose. Sugars which are formed by the combination of two or more molecules of a simpler sugar have names with the terminations -biose, -triose, etc., to indicate the number of molecules so combined, while the prefix shows the sugar from which they are derived, as lactobiose, hexatriose, etc. The names dextrose and lævulose, for the two sugars of the formula  $C_6H_{12}O_6$ , which are formed by inversion of cane-sugar, have been abandoned, since these substances are not merely optically, but structurally different, and each can exist in a dextro-rotatory and a lævo-rotatory form; they are replaced by the terms glucose and fructose, respectively. Glucose is an alcohol-aldehyde, represented by the formula  $CH_2OH(CHOH)_4CHO$ , and is the type of a number of sugars containing the aldehyde group—CHO, and hence called aldoses; while fructose,  $CH_2OH(CHOH)_3COCH_2OH$ , is the type of those containing the ketone group—CO—, and therefore called ketoses.

<sup>1</sup> Pharmaceutical Journal and Transactions, Oct. 29, 1892, p. 348.

a cultivated plant in many gardens; it is the source of broom. The clovers, red and white, *Trifolium pratense* and *T. repens*, have uses more empirical than general. The sweet clovers, *Melilotus officinalis* and *M. alba* have also limited applications, and their effects are supposedly due to the odorous principle, cumarin. They are fine plants, and lend an agreeable perfume to the natural highways as well as the artificial ones of man. *Robinia Pseudacacia*, or common locust tree, has been used by the Eclectics to some extent. It is met with here only in cultivation, but in Lancaster County seems to be native and very abundant. *Stylosanthes elatior*, a plant with more name than size, common in sandy soil, has been put on the list of new remedies, and we shall expect something. The same can be said of the Judas tree, *Cercis canadensis*; but in the meanwhile it remains a handsome shrub or tree when in bloom in early spring. The flowers are deep rosy pink and are placed close to the branches for some distance down the stem. As they are produced some time before the leaves, the effect produced by the blossoming is very striking. Then we have in this order also *Cassia Marilandica*, that some authorities state rivals the officinal senna. Many country people use it altogether in place of senna. It is a very neat plant, growing along water-courses, 3 or 4 feet high, leaflets 12-18, about 1 inch long, the stem terminated by an ample panicle of yellow flowers.

*Prunus Virginiana*, order Rosaceæ, is an old stand-by in our stores, but our botanists do not stand by it; for the *Prunus Virginiana*, of Linnæus, is our choke cherry, only a tall shrub with gray bark, while the officinal bark comes from *P. serotina* of Ehrhardt, which is a large tree with dark brown bark. Loiseleur called this species *Cerasus serotina*, as did DeCandolle, but Michaux called it *C. Virginiana*. *Spiræa tomentosa* is quite common in the southern portion of New Jersey, and is a worthy representative of the genus. *Gillenia trifoliata* is common to Eastern Pennsylvania, known as Indian physic, and is a frequenter of woodlands, but well scattered. The genus *Rubus* furnishes us with the beautiful species: *R. odoratus*, for which we claim no remedial virtues at present; *R. strigosus* and *R. villosus*, the blackberry and raspberry, are very well known and easily recognized. *Fragaria vesca* and *Potentilla canadensis* are old friends, now appearing with the same faces among new remedies and we look for work.

The order Saxifragaceæ sends us *Heuchera Americana*, though all species are noted for their great astringency. The species named is quite common.

*Drosera rotundifolia*, from swamps in New Jersey, is an addition to materia medica, and we hope it may prove as interesting to medical science as it has to histological workers.

The order Hamamelideæ, on following the divining rod to its point, shows us the witch hazel, bending far out over the little stream of water. There is nothing remarkable about *Hamamelis Virginiana*, unless it is the fact of its putting forth its flowers when it and all others have dropped their leaves, which renders it very prominent then, of course.

*Opuntia vulgaris* is the only member of the cactus tribe that we have in the East, and most of that is found in New Jersey. It is not likely to soon become a valued drug, but it will always remain a fine cultivated plant. We cannot refrain from calling your attention to the magnificent growth of this plant on the rocky cliffs along the Delaware River, above Milford, N. J. They

seem to have fallen over the topmost edge, and found a lodging on the first place they fell, whence by repeated falls from unseen causes they continued to spread themselves till the ground floor was reached. In the early part of July of this year it was our good fortune to be at this place, and they were just in their prime of bloom. The plants and flowers were both larger than any we had ever seen in sandy soil.

Standing at the base of the cliff and slowly raising the eyes to the top, the numerous borders of sulphur yellow flowers on the edges of those deep red rocks that stood out at every few yards, until they reached the summit, made a magnificent picture by nature that man could not imitate without marring its best features.

The carrot family is represented by *Daucus Carota*, which is too abundant for any possible good. *Angelica atropurpurea* has had its place in materia medica, but is now in disuse, and still able to retain its rank growth among its own moist wayside friends, just the same. Sweet Cicely, *Osmorrhiza longistylis*, we must not forget, cannot in fact, as every country boy will call our attention to it on account of the sweet feasts on its pleasant-tasted roots. They are very anisate, and quite stomachic and carminative. *Eryngium yuccifolium* of Michaux is commonly called button snake root, rattlesnake master, eryngo and corn snake root. While it is carminative, some authorities place it as an equal to senega. We await further testimony.

Under the order Araliaceæ we have every native species of aralia represented in Eastern Pennsylvania. Beginning with the smallest, *Aralia trifolia*, or dwarf ginseng, we have also *A. quinquefolia* or true ginseng, *A. nudicaulis* or wild sarsaparilla, *A. hispida* or bristly sarsaparilla, *A. racemosa* or spikenard, and last and largest, *A. spinosa* or Hercules' club. The dwarf ginseng, wild sarsaparilla and spikenard are widely distributed; the ginseng is found only in remote places, and the bristly sarsaparilla to our knowledge only in the Blue Mountains, near Hamburg. *A. spinosa* grows only in Fairmount Park, in Bartram's Garden and near Gray's Ferry.

With the order Cornaceæ we have reached the dogwoods. *Cornus florida*, *C. circinnata* and *C. sericea* are abundant in this State, the first-named forming one of our finest flowering small trees in spring. The others are more shrubby in manner of growth, and have not the large colored bracts that render the former conspicuous in bloom.

We have with these completed a larger scope of botanical territory than we thought possible, and we extend our thanks for your attention.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 20, 1892.

On motion, Dr. A. W. Miller was called to the chair.

The minutes of the last meeting were read, and, there being no corrections required, they were ordered to stand approved.

Prof. Trimble presented a volume to the library.

A paper, on various *indigenous plants of medical interest*, was read by Joseph Crawford, Ph.G., accompanied by a large number of very carefully prepared specimens. On motion, a vote of thanks was presented to the author, with a request that he continue the subject at some future meeting. The variation



in the names of some of the plants was noticed, and Professor Maisch explained the reason for some of the differences.

A paper, on the *coloring principle of the poke berry*, *Phytolacca decandra*, was read by Herman Harms, of the present Senior Class. The intensity of the color was shown by the great dilution of which it was susceptible.

Dr. Gubbins, a graduate of our College, was present, and alluded to the interest that the paper of Mr. Crawford ought to excite in the students of botany, and alluded to some of the trees which ought to be utilized for shade purposes, especially the hard maple and the buttonball tree. Both of these were growing luxuriantly in Bartram's Garden, near the Gray's Ferry bridge, a place that is world-renowned among botanists.

Dr. Gubbins also exhibited a modification of the hand-compressing pill machine, and described its advantages. It consists of three parts: the cylinder, which has a funnel-shaped top for facility of charging it; the foot, which is conical and enters the cylinder only one-sixteenth of an inch; and the piston, which works in the cylinder very accurately, but easily. This construction enables the operator to free the pill very readily when it has been compressed.

J. W. England read a paper upon *some practical notes on pharmacy*.

Mr. Procter alluded to the prescription mentioned in last month's meeting containing *jurubeb*, and said it had been brought to him several times. It emanated from some philanthropic preacher, who would supply it if those wanting it could not obtain it elsewhere.

A question was asked about the propriety of keeping *Basham's Mixture* ready for use, excepting the tincture of chloride of iron, the latter to be added at the time of dispensing it. Mr. Procter said it had been his habit to do so, but for this purpose had made it double as strong, as directed by the Pharmacopœia, and diluted it when wanted.

A prescription which had been submitted to Mr. Beringer was read; it called for *hyoscine* in  $\frac{1}{2}$  grain doses when  $\frac{1}{300}$  to  $\frac{1}{150}$  was the proper dose of the crystalline alkaloid. The former dark colored article is an entirely different preparation.

Attention was called to *Cyclamin*, as to what it was; it was stated to be a sulphuretted *lanolin*.

On motion, the meeting adjourned.

T. S. WIEGAND, Registrar.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

### *Proceedings of State Pharmaceutical Associations:*

The following not previously noticed have been received:

*California*.—Semi-annual meeting, held at Los Angeles, May 23 to 25, 1892. Pp. 157.

Quite a number of papers on practical subjects were read at this meeting, and also discussed by the members present. John Devine, president; D. D. Hunt, San Francisco, secretary.

*Connecticut*.—Sixteenth annual meeting, held at Hartford, Febr. 2 and 3, 1892. Pp. 164.

A considerable portion of the pamphlet is occupied by a report on pharmacy, prepared by E. T. Vance, and giving abstracts of many practical papers relating



to pharmacy published during the preceding year. The next annual meeting will be held at New Haven, on the first Tuesday of February; John W. Lowe, local secretary; Fred. Wilcox, Waterbury, permanent secretary.

*Minnesota*.—Eighth annual meeting, held at Duluth, July 13 and 14, 1892. Pp. 92.

A brief account of the transactions of this meeting was published on p. 499 of our last volume. The time and place for holding the next annual meeting has not yet been announced. The secretary is C. T. Heller, St. Paul.

*Washington*.—Third annual meeting, held at Seattle, May 9 to 11, 1892. Pp. 56.

A brief report of this meeting will be found on p. 387 of our last volume. The Association will meet again in Spokane, on the second Monday of May next. W. B. Shaw, Seattle, is secretary.

*Wisconsin*.—Thirteenth annual meeting, held at Oshkosh, August 9 to 11, 1892, pp. 108; and Report of the State Board of Pharmacy, pp. 40.

On p. 500 of our last volume, a notice of this meeting will be found. In addition to a number of practical papers read, the pamphlet contains also theses from the School of Pharmacy of the University of Minnesota. The next meeting will convene at Fond du Lac, August 8; Jas. T. Dana, local secretary; E. B. Heimstreet, Janesville, permanent secretary.

*Pharmakognosie*.—Ein Lehr- und Handbuch für Studierende, Apotheker, Drogisten, Sanitätsbeamte und Aerzte. Von Dr. August Vogl, Hofrath und Universitäts-Professor. Wien, Carl Gerold's Sohn. 1892. 8vo. Pp. 694.

Pharmacognosy; a text-book and manual for students, apothecaries, druggists, sanitary officers and physicians. Price, in paper, 20 marks.

The author, who is well known for his pharmacognostical labors, has produced a very comprehensive work, which deserves also to be known and consulted on this side of the Atlantic, since it does not confine itself to the pharmacopœial drugs of Austria, but takes into consideration also most of those which are employed in the United States; and because it enters fully into the structural characteristics of the drugs described.

The descriptions of the small number of drugs obtained from the animal kingdom occupy about twenty pages, and considerably less space is required for the few drugs derived from the mineral kingdom; but about 500 pages are required for the vegetable drugs.

The latter are considered under three distinct divisions, of which the first comprises those that are readily recognized as plants or parts of plants. The drugs of this division are systematically arranged into twelve groups, as follows: Fungi, lichens, algæ, herbs (including fronds of ferns and twigs), leaves and leaflets, leaf buds, flowers and parts of flowers, fruits, seeds, over-ground axes and parts of axes (barks, stems and woods), subterranean parts, and finally excrescences (galls). The arrangement of the drugs not containing reproductive organs is effected from structural characteristics, namely, the leaves from the nature of the nervation and the character of the margin; the fruits from the nature of the union or the development of different parts; the seeds from the presence or absence of albumen; the roots and rhizomes from the arrangement of the fibrovascular tissue, etc. It will be seen that as far as

possible structural and histological characters have been chosen for the classification of plant parts, and that the subterraneous axes are considered together in one group, which is explained by the impossibility of strictly separating root drugs from rhizome drugs, since with few exceptions the commercial drugs consist of both organs.

In the descriptions of the different drugs, the author lays particular stress upon the histological characteristics, as seen by means of a pocket lens and under the microscope, and these descriptions are so clear that the reader scarcely notices the absence of micro-drawings, which are given only for a limited number of drugs; but frequent references are made to the pharmacognostical atlas published by the author a few years ago.

The second class of vegetable drugs comprises those possessing a distinct structure, recognizable only by means of the microscope, like the starches, glands and hairs; and in the third class are found the sugars, gums, milk juices, resins, balsams (oleoresins), volatile oils, fats and extracts, or in other words, those drugs which are destitute of cellular structure. All these are treated with the same comprehensiveness as those of the first class, in regard to origin, characteristics, varieties, composition, etc.

Over one hundred pages of the work are devoted to the methods of examination by means of the microscope, the preparation of the material, the micro-chemical reagents, the vegetable cell, its contents and the different tissues. A concluding chapter gives information on the collection of medicinal plants and plant parts; on the influence of cultivation and climate upon the constituents; upon drying, garbling and other modes of preparing the drugs for commerce; upon the influence of moisture, air and light, and upon proper methods of preservation.

*The Pharmacy and Poison Laws of the United Kingdom*: their history and interpretation. With a brief account of the Pharmacy laws in force in Australasia, Canada and Cape Colony. London: Office of the Chemist and Druggist. Pp. 220. Price, 2s. 6d.

A very interesting historical account of pharmaceutical legislation in Great Britain, and of the legal decisions on prosecutions having arisen under the provisions of the various acts. A knowledge of the history of their inception, of the opposition to their enactments, of their gradual perfection, and of their legal interpretations is undoubtedly most conducive to the correct appreciation of the objects of these statutes. We heartily recommend this volume to the careful perusal of those who take an interest in pharmaceutical legislation in the United States, since the experience of other countries should throw light upon the probable results of analogous legislative action. Pharmaceutical legislation in the United States dates back little more than twenty years; yet its history is but very imperfectly known, and in a number of cases entirely ignored; a critically prepared and reliable work like the one before us, but applying to the struggles for pharmaceutical legislation in the different States of the Union, would be highly instructive and of great value to those who have the future welfare of pharmacy at heart.

## CLASSES

—OF THE—

## PHILADELPHIA COLLEGE OF PHARMACY,

SEVENTY-SECOND ANNUAL SESSION, 1892-1893.

## JUNIOR LIST.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Abbott, William Gilbert,	Trenton,	N. J.	S. D. Woolley, Ph.G.
Alsop, John Warburton,	Fremont,	Pa.	G. P. Scheehle.
Anewalt, Ellsworth Quincy,	Catasauqua,	Pa.	Smith, Kline & French Co.
Atkins, Frank Hearn,	Lebanon,	Pa.	Dr. W. B. Means.
Bahn, Edwin M.,	York,	Pa.	H. A. Hay.
Baker, J. O.,	Merion,	S. C.	J. C. Wilcox.
Barnitz, Harry L.,	Chambersburg,	Pa.	Jno. S. Barnitz.
Bauer, Edward Julius,	Philadelphia,	Pa.	Dr. S. G. Bauer.
Biddle, Louis Ames,	Camden,	N. J.	M. M. Osmun.
Biedert, Charles Christian,	Philadelphia,	Pa.	Edwin Harris.
Binns, Harry Ring,	Germantown,	Pa.	B. A. Wissler.
Bishop, Frank Gerald,	Pennington,	N. J.	G.W. Scarborough, Jr.
Black, Charles Jeffries,	Chambersburg,	Pa.	Cressler & Keefer.
Black, James Hamilton,	Myersdale,	Pa.	Dr. W. F. Robeson.
Blackmer, Fred Holland,	Ithaca,	N. Y.	Judson B. Todd.
Blair, Charles Lee,	New Oxford,	Pa.	J. W. Hoffa.
Blithe, Henry Albert,	Philadelphia,	Pa.	Henry Blithe.
Blumhart, Charles Albert,	Philadelphia,	Pa.	J. V. Slaughter.
Bole, Robert, Jr.,	Philadelphia,	Pa.	J. B. Reynolds.
Bolton, Alfred Harrison,	Philadelphia,	Pa.	A. H. Bolton.
Bowen, Willis Elliott,	Churchville,	N. Y.	J. H. Bushnell.
Brallier, Stanley A. E.,	Indiana,	Pa.	H. A. Newbold.
Brandt, Harvey Eshleman,	Marietta,	Pa.	H. N. Snyder.
Britcher, Milton Weimer,	Dillsburg,	Pa.	Dr. H. W. Frishel.
Brannon, Frederick Winston,	Medford,	N. J.	H. P. Thorn.
Brennan, Clara Estelle,	Newark,	O.	F. W. E. Stedem.
Brennan, Frederick Henry,	Philadelphia,	Pa.	H. M. Brennan.
Brown, Daniel Edward,	Zanesville,	O.	Bailey Drug Co.
Brown, Frank Flynt,	Groesbeck,	Tex.	W. W. Brown, M.D.
Brown, Gordon S.,	Laurelton,	Pa.	E. W. Rowland.
Brown, Wilbur Beers,	Jersey Shore,	Pa.	B. E. Staples.
Brunier, George W. G.,	Philadelphia,	Pa.	C. H. Bohm.
Bucher, William Lewis,	Columbia,	Pa.	Wm. M. Borden.
Bush, Harvey Benjamin,	Bethlehem,	Pa.	C. E. Spenceley.
Butz, Newton,	Weserville,	Pa.	Augustus Weber.
Buxton, Thos. Alex. Moore,	Pittsburg, South Side,	Pa.	S. E. Merrett, M.D.
Caffrey, John Boniface,	South Bethlehem,	Pa.	J. E. McBride.
Cahill, Thomas Melville,	Philadelphia,	Pa.	Dr. J. M. Malatesta.
Cameron, Arthur Thompson,	Zion,	Md.	J. Lawson Crothers.
Cameron, Frank Butler,	Smyrna,	Del.	H. C. Blair's Sons.
Campbell, Robert,	Belfast,	Ireland,	Dr. J. Frank Meade.
Campbell, Thomas Palmer,	Philadelphia,	Pa.	Funk & Groff.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Cappean, Thomas Harrison,	Wilmington,	Del.	N. B. Danforth.
Carpenter, Edward Albert,	Plano,	Tex.	W. S. Whiteley.
Carroll, Robert Allen,	Philadelphia,	Pa.	S. L. Carroll.
Cavanagh, Charles Joseph,	Clifton Heights,	Pa.	Jno. Ogden & Co.
Chalfant, Charles Joshua,	Unionville,	Pa.	D. F. Schull & Co.
Chatham, John Eliason,	Smyrna,	Del.	W. C. Kelly.
Christ, George Raymond,	Pinegrove,	Pa.	G. W. Schools.
Claudy, Robt. Blean,	Newville,	Pa.	Dr. B. F. Emerick.
Crawford, John Yokum,	Bryn Mawr,	Pa.	A. W. Wright & Co.
Craig, Harvey Alfred,	Philadelphia,	Pa.	
Coar, Thos.,	Hulmeville,	Pa.	D. F. Shull & Co.
Conrey, Henry Slicer,	North Branch,	Md.	J. T. Shinn, Ph.G.
Cornell, Horace Hogeland,	Philadelphia,	Pa.	R. Gluck.
Cuddy, Robt. Dowling,	New Brunswick,	N. J.	E. D. Palmer.
Culley, John,	Ogden,	Utah,	J. J. Driver.
Dare, Charles Wilfred,	Bridgeton,	N. J.	C. F. Dare.
Deen, Frank Snyder,	Lancaster,	Pa.	Charles E. Long.
Deweese, Wm. Holstein,	Philadelphia,	Pa.	Finnerty, McCure & Co.
Dilks, Jr., Harmon,	Bridgeton,	N. J.	G. H. Whipple.
Doughty, Albert,	Wilmington,	Del.	J. M. Harvey.
Douglass, William Tyler,	Harrisburg,	Pa.	J. C. Perry.
Draper, Oscar Carman,	Wilmington,	Del.	W. C. Taylor.
Dunn, Edward Walker,	Salem,	N. J.	W. Henry Dunn.
Duvall, Augustus Walton,	Seaford,	Del.	Dr. A. W. Duvall.
Eakin, Henry Gray,	Bucks County,	Pa.	C. A. Eckels.
Egloff, William,	Philadelphia,	Pa.	W. A. Smith.
Ellis, David,	Philadelphia,	Pa.	Howard S. Eckels.
Ely, Frank William,	Williamsport,	Pa.	J. Miles Yost.
Engle, Stratton Roger,	Burlington,	N. J.	J. W. Davis.
Evans, Edwin August,	Philadelphia,	Pa.	Ross Brothers.
Eyre, Edward Augustus,	Bloomsburg,	Pa.	Moyer Brothers.
Fackenthall, John Michael,	Springtown,	Pa.	M. M. Buss.
Farnsworth, Anthony, Jr.,	Lock Haven,	Pa.	Geo. W. Mason.
Farrow, Charles Taylor,	Philadelphia,	Pa.	H. Tomlinson.
Faunce, Benjamin Rice, Jr.,	Philadelphia,	Pa.	W. H. Faunce.
Faust, Peter,	Scranton,	Pa.	Carl Lorenz.
Field, Benjamin Franklin,	Denton,	Md.	W. H. Hobson.
Fishburne, Pliny,	Waynesboro,	Va.	Miles & Fishburne.
Fisher, John J.,	Columbia,	Pa.	C. F. Markel, M.D.
Fisher, William Henry,	Milton,	Del.	S. L. Dilks.
Fluck, Charles Lewis,	Allentown,	Pa.	Peters & Smith.
Flanagan, Thomas Francis,	Mahanoy City,	Pa.	A. A. Weber.
Fowler, Hudson De Mott,	Sandusky,	O.	H. Moller, M.D.
Freethy, Charles Henry,	Hawley,	Pa.	Dr. H. A. Plum.
Gabrio, Frank Peter,	Hazleton,	Pa.	McNair & Hoagland.
Gargan, John Joseph,	Philadelphia,	Pa.	C. J. Biddle.
Gary, John Harry,	Thurlow,	Pa.	W. C. Kelly.
Geety, Wallace Gillespie,	Harrisburg,	Pa.	Forney & Kuouse,
Genther, Frederick Edwin,	Philadelphia,	Pa.	E. H. Feinhold.
Gerlach, Herman,	Milwaukee,	Wis.	W. Goess.
Goico, Ernest,	Porto Rico,	W. I.	C. J. Monagas.
Gorman, Patrick James,	South Bethlehem,	Pa.	J. E. McBride.
Gould, Josiah Cole,	Easton,	Pa.	F. L. Melres.
Gunn, Frank,	Philadelphia,	Pa.	Dr. J. H. B. Emick.
Hahn, Charles,	Minersville,	Pa.	Carrie E. Howard, Ph.G.
Hallman, Harry Hershberger,	Norristown,	Pa.	J. H. Greenawalt.
Hamel, Henri Alfonse,	Fraserville,	Can.	J. A. Hamel, M. D.
Hamilton, Charles Ernest,	New Lisbon	O.	M. N. Hamilton.
Hamilton, James Harry,	Mt. Holly,	N. J.	E. B. Jones.



<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Hamilton, Wm. Alexander,	Philadelphia,	Pa.	
Hargrave, Seymour Livingston,	Snowhill,	N. C.	P. Pitch.
Harned, Joseph Edward,	Oakland,	Md.	H. J. Mayers.
Hauck, Frederick,	Nuremberg,	Germany,	Rudolph Sulzer.
Harvey, Elisha George,	Lewisburg,	Pa.	B. S. Harvey.
Hayman, Walter,	Lubinvilla,	Pa.	Dr. C. Lashelle.
Heichhold, H. P.	Philadelphia,	Pa.	Vandegrift & Rice.
Heine, Edward Daniel,	Natchez,	Miss.	Dr. R. W. Jones.
Hendee, Ulysses Grant,	Jamestown,	N. Y.	Hatch & Briggs.
Henderson, Fred. Benton,	Brooksville,	Pa.	E. B. Henderson.
Henderson, Robert Guy,	Corinth,	Miss.	R. Henderson.
Hendrickson, Wm. Randolph,	Philadelphia,	Pa.	
Herbert, Thomas Lewis,	Philadelphia,	Pa.	Wm. Hummell.
Herbst, Frederick,	Philadelphia,	Pa.	August Hohll.
Herbst, Fred John,	Honesdale,	Pa.	R. Duane Reed.
Herr, H. C.	Moorestown,	N. J.	W. S. Reeve.
Hermann, William,	Middleport,	Pa.	Albert Cable
Hodgson, Jesse Finley,	Clarksville,	Tenn.	Lockitt & Askew.
Hodil, James J.,	Sharon,	Pa.	A. S. Beck.
Holliday, John Thomas,	Millington,	Md.	H. Diefenbeck.
Holt, James Stephen,	Philadelphia,	Pa.	John McFerran.
Horwell, Joseph Arthur,	Williamstown,	Pa.	H. L. DeKalb.
Hostelly, Joseph,	Philadelphia,	Pa.	T. W. Hargraves.
Holtzing, John Rewalt,	Wrightsville,	Pa.	W. S. Tinsley.
Howell, Edward Vernon,	Raleigh,	N. C.	W. H. King & Co.
Howell, Harry Field,	Easton,	Pa.	G. M. Beringer.
Hubley, John Hiram,	Carlisle,	Pa.	J. C. McMillan.
Hughes, Harry Bittenbender,	Shamokin,	Pa.	E. L. Reading.
Hussham, Horace Besson,	Norristown,	Pa.	Wm. Camm.
Immel, Raymond D. Turk,	Reading,	Pa.	J. K. Faust.
Jackson, Thomas,	Philadelphia,	Pa.	L. W. Hildenbrand.
Jennings, Joseph,	Moosic,	Pa.	J. E. Lehman.
John, Albert Torrence,	Mt. Carmel,	Pa.	Dr. M. L. Emerick.
Jordan, Calvin S.,	Harrisville,	W. Va.	W. K. Litz.
Kachline, Frederick William,	Easton,	Pa.	Weaver & Solliday.
Kalbach, Charles Peter,	Berville,	Pa.	D. S. Jones.
Kalbach, Harry Adam,	Robesonia,	Pa.	R. E. Moyer.
Kappes, George Louis,	Zanesville,	O.	E. M. Boring.
Kaufman, Reuben M.,	Chambersburg,	Pa.	Jos. McKee.
Keagy, Edwin J. Warner,	Altoona,	Pa.	Wm. C. Craine.
Kellner, Harry Charles Fred.,	Philadelphia,	Pa.	Sam'l Gerhart.
Kennedy, Alvis B.,	Bonham,	Tex.	J. W. Peeler.
Kelley, John Joseph,	Conshohocken,	Pa.	T. F. McCoy.
Kilmer, Alvin Casper,	Montgomery,	Pa.	John L. Miller.
Kinsler, Lemuel Pastorius,	Mt. Airy,	Pa.	J. A. Jeffries.
Kintzing, Frederick Gravenstein,	Lock Haven,	Pa.	E. B. Shoemaker.
Kreider, Frank Light,	Lebanon,	Pa.	L. A. Podolski.
Krumrine, Sidney,	State College,	Pa.	Dr. W. S. Glenn.
Kuhns, Edward Jacob,	Fogelsville,	Pa.	Emlin Martin.
Lacey, Charles,	Ridley Park,	Pa.	I. J. Grahame.
Lanterman, B. Larue,	Blairstown,	N. J.	A. Lincoln Sirfass.
Lauténbacher, Wm. Roth,	Tamaqua,	Pa.	I. Lauténbacher.
Leaman, Davis Hendrix,	Reading,	Pa.	W. M. Koenig.
Leedom, Morris,	Newton,	Pa.	Watts & Leedom.
LeFevre, Acton Ash,	Lancaster,	Pa.	M. W. Raub, M.D.
Lehman, Joseph Davis,	Manayunk,	Pa.	L. A. Kelly, M.D.
Light, Walter Felix,	Lebanon,	Pa.	A. C. Hirsh.
Linn, William Elliot,	Philadelphia,	Pa.	J. C. Keys.
Long, Charles Henry,	Lebanon,	Pa.	Dr. Geo. Ross & Co.



<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Long, Wm. Wilson,	Lavisburg,	Pa.	E. B. Evans.
Lord, John Edward,	Upland,	Pa.	J. F. Judge.
Lorenz, Charles Gustavus,	Philadelphia,	Pa.	L. C. Funk.
Loser, Damian Aloysius,	Lebanon,	Pa.	J. F. Loehle.
Luft, George William,	Salt Lake City,	Utah,	O'Conner & Shaffer.
Lukens, Chas. Baker,	Philadelphia,	Pa.	D. A. Over.
Lutz, Walter Preston,	Salem,	N. J.	Bullock & Crenshaw.
Lynn, Wm. Wirt,	Philadelphia,	Pa.	E. Jungmann.
McClure, Edward Richard,	Philadelphia,	Pa.	Finnerty, McClure & Co.
McConomy, Paul Lucian,	Philadelphia,	Pa.	I. C. Long.
McCormack, Alexander,	Philadelphia,	Pa.	W. E. Lee.
McDermott, James,	Delaware County,	Pa.	
McGlashen, Joseph Porter,	Philadelphia,	Pa.	J. M. Wallis.
McLennan, Edward Hughes,	Philadelphia,	Pa.	W. E. Supplee.
McWhorter, Irving Vallandigham,	Wilmington,	Del.	Dr. J. C. Fahey.
Mack, James Williams,	Slatington,	Pa.	J. S. Mack.
Mackenzie, Edwin,	Wilmington.	Del.	Z. Young Bett.
Mader, Elias,	Lebanon,	Pa.	E. H. Gingrich.
Makofski, Leon,	Nanticoke,	Pa.	F. P. Crotzer.
Manger, Charles Christian,	Boonville,	Mo.	W. E. Roeschel.
Manko, Emanuel,	Philadelphia,	Pa.	S. E. R. Hassinger.
Martin, John Corson,	Dayton,	O.	Bippus & Breidenbach.
Martin, Samuel E.,	Wilmington,	Del.	F. W. Fenn.
Matthews, Charles Morgan,	Philadelphia,	Pa.	David Dalton.
Mayberry, Edwin Daniel,	Allentown,	Pa.	G. W. Shoemaker & Co.
Mertz, Robert H.,	South Bethlehem,	Pa.	D. Jamison, Jr.
Merscher, George Edward,	Philadelphia,	Pa.	Jean Robert Moechel.
Meyers, George Henry,	Bryantville,	Pa.	H. F. Backinstor.
Meyers, Henry Isaac,	Lanark,	Pa.	W. H. Gano.
Michener, Elmer David,	Duncannon,	Pa.	C. F. Chandler.
Miller, Albert D.,	Cleveland,	O.	C. O. Tolkins.
Miller, Albert T.,	Hamlin,	Kan.	John Sterns.
Miller, Charles Glang,	South Easton,	Pa.	Dr. C. A. Weidemann.
Miller, Harper Guiler,	South Easton,	Pa.	Aaron Spengler.
Minton, Henry McKee,	Philadelphia,	Pa.	C. S. Porter.
Mitchell, Albert Tippet,	Newtown,	Pa.	R. J. Weber.
Moore, Maurice Augustus,	Union,	S. C.	Dr. A. A. Moore.
Moritz, Birdis Emanuel,	South Bethlehem,	Pa.	R. H. Lacey.
Moyer, Ralph Rodes,	Roxboro,	Phila.	French, Cave & Co.
Murphy, Michael Charles,	Plymouth,	Pa.	C. Moylan.
Nagle, Clayton Moyer,	Pottstown,	Pa.	Dr. Porter.
Neely, Horace S.,	Wilmington,	Del.	J. M. Griffin.
Newman, Charles Thompson,	Marshalltown,	Ia.	C. J. Lander.
Newman, Samuel Albert,	Cleveland,	O.	J. W. Deutsch.
Nugent, Thomas Franklin,	Utica,	N. Y.	J. H. Sheehan & Co.
Ohail, Irvin Edwin,	Wooster,	O.	A. W. Blackburn.
Pachali, Jr., Theodore,	Reading,	Pa.	A. D. Pollard & Co.
Parse, Merritt,	Flemington,	N. J.	J. S. Cooley.
Peil, G. William,	Honesdale,	Pa.	Jadwin & Spencer.
Pennell, Jerome Chester,	Bridgeton,	N. J.	Bullock & Crenshaw.
Phillips, George Warren,	Gordon,	Pa.	J. E. Gregory.
Phillips, Oscar Wilson,	Caldwell,	O.	W. H. Bowron.
Phillips, William Newton,	Zanesville,	O.	Adams & Davis.
Pickering, George Wellington,	Scranton,	Pa.	F. M. Bouton.
Pickett, J. Frank,	New Hope,	Pa.	D. S. Jones.
Pilgrim, John W.,	Bridgeton,	N. J.	H. E. Jones.
Place, Charles Ross,	Stroudsburg,	Pa.	L. Gerhard.
Poole, Henry Harrison Higbee,	Bristol,	Pa.	J. E. Wright.
Porter, Samuel H.,	Pottstown,	Pa.	Dr. J. E. Porter.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Provin, William A.,	Westfield,	Mass.	S. Z. St. John.
Raum, Shelton Bailly,	Carlisle,	Pa.	J. C. Alteck & Co.
Rectenwald, Louis Aloysius,	Pittsburg,	Pa.	F. W. E. Stedem.
Reese Lewis,	Hazleton,	Pa.	H. C. Manlow.
Reeser, Richard,	Mechanicsburg,	Pa.	A. H. Smith, M.D.
Regar, Daniel Schaeffer,	Denver,	Pa.	Theo. Doench.
Remley, Charles Cordy,	Lancaster,	Pa.	W. O. Frailey.
Rhein, Frank Xavier,	Mansfield,	O.	S. P. Wright.
Rhoads, Edward Elliott,	Reading,	Pa.	H. M. Muhlenberg.
Richards, Frank Gore,	Hannibal,	Mo.	DeGaris Bros.
Richardson, Arthur Norris,	Portland,	Ind.	
Ridenour, William Edward,	Springfield,	O.	J. D. Lisle.
Ritter, Frederick Wm.,	Middleport,	Pa.	T. M. Newbold.
Robinson, Raleigh,	Hatboro,	Pa.	Dr. W. T. Robinson.
Rock, Peter Joseph,	Sutton,	Neb.	Geo. J. Crumbie.
Roessner, Frank George,	Philadelphia,	Pa.	C. Weiss.
Rogers, George Rowland,	Carbondale,	Pa.	C. M. Driggs.
Roseman, Charles Edward,	Massillon,	O.	E. S. Craig.
Rossman, George Albert,	Chambersburg,	Pa.	J. H. Sternier.
Rowe, Thomas Maurer,	Reading,	Pa.	B. A. Hertsh.
Royer, Charles Henry,	Harrisburg,	Pa.	J. V. Slaughter.
Russell, Benjamin Alden,	Ilion,	N. Y.	Ogden & Downs.
Rutherford, John Burton,	Philadelphia,	Pa.	C. A. Rutherford.
Sallade, Raymond Ellwood,	Womelsdorf,	Pa.	F. T. Landis.
Saltzer, James Albert,	Sacramento,	Pa.	H. James Batdorff.
Schearer, Weaver H.,	Reading,	Pa.	A. Schleich.
Schmalzriedt, Frederick,	Philadelphia,	Pa.	W. R. Warner & Co.
Schumann, August Frank,	Philadelphia,	Pa.	P. G. A. Weber.
Scott, Charles Abbey,	Oneonta,	N. Y.	E. E. Ford.
Scott, James Patrick Edward,	Philadelphia,	Pa.	J. R. Mallon.
Seiple, Harry Bertram,	Philadelphia,	Pa.	Leidy Seipel.
Semple, John,	Upland,	Pa.	O. P. Hooper.
Sheely, Edward Valentine,	New Oxford,	Pa.	H. C. Blair's Sous.
Shelton, Charles F.,	New Lisbon,	O.	J. S. Marquis.
Shoemaker, Charles Benjamin,	Hummelstown,	Pa.	G. H. Shoemaker & Co.
Shoemaker, Clinton Lewellyn,	Allentown,	Pa.	W. H. Sutton.
Shreve, Alexander Ross,	Philadelphia,	Pa.	J. L. Nebinger.
Shultz, John Wilson,	Lancaster,	Pa.	Dr. S. B. McCleery.
Simons, Henry Fisher,	Philadelphia,	Pa.	David C. Lyman.
Slifer, Leo Eugleman,	Philadelphia,	Pa.	Dr. W. H. Ziegler.
Smith, Beaton,	Wilmington,	Del.	
Smith, Charles Hye,	Harrington,	Del.	W. H. Farley.
Smith, James Auburn,	London,	O.	J. R. Atchison.
Smith, J. Kirk,	Downingtown,	Pa.	P. Fitch.
Smith, John Ritner,	Harrisburg,	Pa.	J. N. Clark, M.D.
Smith, George Burton,	Zanesville,	O.	W. P. Wells.
Souder, Clinton,	Millville,	N. J.	Finnerty, McClure & Co.
Spickler, Walter Scott,	Lancaster,	Pa.	W. T. Hock.
Sprenger, William Alfred,	Lancaster,	Pa.	A. G. Frey.
Stengel, Arthur,	Philadelphia,	Pa.	Wm. Harris.
Stephen, Walker Lewis,	Reading,	Pa.	W. M. Koenig.
Stern, Charles Wilson,	Smyrna,	Del.	Wyeth & Bro.
Stevenson, Fred. Lee,	Princess Ann,	Md.	M. A. Toulson.
Stoner, Margaret Weston,	Norristown,	Pa.	Dr. Alice Bennett.
Stout, Charles A.,	Philadelphia,	Pa.	Frank Morse.
Stradley, Harry, Bininghove,	Wilmington,	Del.	B. R. Veasey.
Sulouff, Samuel Henry,	Patterson,	Pa.	J. R. Rewalt.
Swartz, Edward Forest,	Hughesville,	Pa.	C. M. Swartz.
Sykes, William,	Norristown,	Pa.	E. A. Perrenot.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Tall, Thomas Anthony,	Chester,	Pa.	John F. Fielding.
Tash, William Souder,	Camden,	N. J.	A. S. Scull.
Thomas, David Walter,	Spartanburg,	S. C.	Arthur Irwin.
Thompson, Alexander Peterson,	Philadelphia,	Pa.	W. L. Cliffe
Thum, John Carl,	Philadelphia,	Pa.	W. F. Steinmetz.
Tomkinson, Horace Lessy,	Harrisburg,	Pa.	B. B. Hamlin.
Toomey, Richard Joseph,	Shenandoah,	Pa.	
Troxell, John Isaac Peter,	Allentown,	Pa.	Peter Smith.
Truckenmiller, Frank Edward,			C. W. Christ.
Tyson, Warren Sunderland,	Morristown,	Pa.	Attwood Yeakle.
Ulmer, Stephen Edward,	Pennsylvania,	Pa.,	F. W. E. Stedem.
Unangst, Harvey Edward.	Easton,	Pa.	C. F. Zaccherle.
Van Horn, Edward Rogers,	Vinton,	Ia.	W. L. Palmer.
Vason, Joseph, Jr.,	Madison,	Ga.	W. E. Adams, M.D.
Warfel, William Sylvester,	Reading,	Pa.	J. H. Stein.
Wasley, Harry Malcolm,	Shenandoah,	Pa.	A. Wasley.
Watson, Joseph Shaffer,	Mt. Holly,	N. J.	F. Macpherson.
Weakley, Charles C.,	Media,	Pa.	Geo. Holland.
Webb, Abner,	Kingsland,	Ark.	Marks, Preston & Owens.
Weber, Howard Elmer,	Mahanoy City,	Pa.	J. L. Supplee.
Wegener, August Gearhard,	Hanover,	Germany,	Dr. Wedemeyer.
Welch, William Henry,	Antwerp,	N. Y.	C. W. Snow & Co.
Wellensiek, Harry W.,	York,	Pa.	H. S. Eckels.
Wells, Joseph Weyburn,	Kane,	Pa.	J. W. Griffith & Co.
Werner, David Thomas,	Avon,	Pa.	
Whitcomb, William Higbee,	Saginaw,	Mich.	A. C. Schofield.
White, Robin Hope,	Mt. Sterling,	Ky.	W. S. Lloyd.
Wike, Wm. Jacob,	Marietta,	Pa.	A. D. Wike.
Wilson, Willetts,	Ithaca,	N. Y.	McLane & Fisher.
Wivil, Oliver Paxon.	Wilmington,	Del.	Standard Pharmacy.
Wolfe, Wm. Holmes,	Baltimore,	Md.	T. B. Cartmel.
Yeakle, Samuel Newton,	Norristown,	Pa.	Wm. Stahler.
Young, Benjamin Franklin,	Coatesville,	Pa.	W. S. Young.
Young, Horace Greely,	Bristol,	Pa.	J. K. Young.
Zentner, Wm. Herman,	Kiod,	Russia,	Dr. Tcharnichof.
Ziegler, Howard Philip,	Reading,	Pa.	P. M. Ziegler.
Zimmermaan, Herbert James,	Johnstown,	Pa.	G. A. Zimmerman.
Zipp, Charles James,	Utica,	N. Y.	Chas. H. Jones.

## SENIOR LIST.

Adams, Bentley Bryant,	Atlantic City,	N. J.	L. C. McClellan.
Adams, James Duffield,	Clayton,	N. J.	R. W. Maris.
Adams, Winfield Scott,	Reading,	Pa.	C. M. Steinmetz.
Aley, Jr., Hamilton,	New York,	N. Y.	W. S. Rorkey.
Alleman, Frank,	Bloomsburg,	Pa.	H. B. Cochran.
Althouse, Frank John,	Harrisburg,	Pa.	H. B. Todd.
Ames, Charles Eugene,	DeRuyter,	N. Y.	H. C. Clapham.
Armstrong, Eugene Curtis,	Odessa,	Del.	Dr. J. A. Ogden.
Atkins, George Hulings,	Wilmington,	Del.	Z. James Bett.
Aughinbaugh, Wm. Culbertson,	Hagerstown,	Md.	D. C. Aughinbaugh.
Bailey, John,	Dover,	Del.	Dr. J. L. D. Morison.
Bailey, John Henry,	South Bethlehem,	Pa.	Geo. Freshell.
Balle, Bismark Henry,	Laurens,	S. C.	J. E. Wilkes, dec'd.
Barlow, Walter Gilbert,	Philadelphia,	Pa.	L. E. Barlow.
Beavers, Frank Washington,	Scranton,	Pa.	G. W. Jenkins.
Benedict, William P.,	Altoona,	Pa.	C. F. Randolph.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Berkstresser, Watson J.,	Huntingdon,	Pa.	J. H. Black.
Boadway, Jacob,	Bethesda,	Canada,	C. G. A. Loder.
Bocking, Edward Francis,	Charleston,	W. Va.	E. S. Boggs.
Bowman, William Frank,	Reading,	Pa.	J. C. Griesemer.
Boyd, John Samuel,	Newcastle,	Del.	C. E. Ferris & Son.
Boyd, Frank Meagher,	Dover,	Del.	J. F. Meade, M.D.
Brellocks, Frederick John,	Philadelphia,	Pa.	M. A. Hull.
Bremer, Albert Sherman,	Philadelphia,	Pa.	M. Sonntag,
Brick, Harry Walter,	Fitchburg,	Mass.	Special.
Bricken, Herman Adam,	Canajoharie,	N. Y.	Dygett & Wohlgenuth.
Brown, Albert Ludwig,	Reading,	Pa.	McCardy & Darhane.
Brown, James Reed Logan,	Greensburg,	Pa.	S. P. Brown.
Bunting, Frank Allison,	Norristown,	Pa.	Wm. Stahter.
Butcher, Charles Monroe,	Parkersburg,	W. Va.	W. W. Kain.
Cain, Maude Florence,	Springfield,	Mass.	W. P. Draper.
Calloun, Albert Reid,	Philadelphia,	Pa.	A. Mott.
Campbell, Theodore,	Philadelphia,	Pa.	W. H. Pile & Son.
Carpenter, Howard Preston,	Wilmington,	Del.	M. B. Danforth.
Carson, Charles Robert,	Mahomet,	Ill.	H. A. Newbold.
Carter, Hubert Gent,	Philadelphia,	Pa.	Jas. Moffett, Jr.
Casey, John Francis,	Philadelphia,	Pa.	Bullock & Crenshaw.
Chance, Albert Arthur,	Seidlersville,	Md.	E. B. Evans.
Cheek, Samuel Lee,	Birmingham,	Ala.	W. R. Jones.
Cherdron, Charles,	Cleveland,	O.	H. Mueller, M.D.
Clark, Harry Griffith,	Brooksville,	Pa.	R. V. Blood.
Cline, William Edward,	Oerstown,	Pa.	J. J. McFadden.
Coffey, Maurice Grant,	Lock Haven,	Pa.	G. W. Mason.
Collings, Walter Nagle,	Philadelphia,	Pa.	D. W. Fleming.
Collins, Edwin Smith,	Rising Sun,	Del.	Dr. N. B. Morrison.
Colston, George Henry,	Great Bend,	Pa.	C. B. Woodward.
Conard, Norman Shoemaker,	Philadelphia,	Pa.	T. E. Conard, M.D.
Conover, Samuel Harry,	Philadelphia,	Pa.	A. C. Schofield.
Cook, William Stephen Gray,	Coatesville,	Pa.	Stephen G. Cook.
Copeland, Harry Thompson,	Patterson,	Pa.	W. H. Banks & Co.
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Crabtree, Samuel Reuben,	Topsville,	Me.	M. I. Porter.
Crawford, James Adam,	Nazareth,	Pa.	Dr. C. A. Weidemann.
Curry, Gordon Laten,	Louisville,	Ky.	J. A. Hexem.
Cushen, Harry Roscoe,	Hagerstown,	Md.	E. R. Gatchell.
Cox, Harry Lehman,	Ephrata,	Pa.	G. S. Royce.
Coxe, Russell Van,	Schuylkill Haven,	Pa.	H. N. Van Coxe.
Dancy, Harry Hymen,	Tarboro,	N. C.	W. H. Macnair.
Dannenhower, Frederick,	Philadelphia,	Pa.	W. A. Fettus.
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Davis, George Warren,	Scranton,	Pa.	A. B. Reed.
Davis, William,	Mt. Carmel,	Pa.	W. Williams & Co.
Deen, William Lewis,	Lancaster,	Pa.	R. H. Lackey.
Deininger, John Wolfersberger,	Mount Joy,	Pa.	P. A. Pyle.
Dengler, George Ludwig,	Reading,	Pa.	N. G. Ritter.
Detwiler, William Penn,	Oaks,	Pa.	E. M. Buckwalter.
Dietrich, Harry Daniel,	Reading,	Pa.	C. Rentschler, Jr.
Donough, Charles Schaeffer,	Myerstown,	Pa.	C. Mulock.
Driver, George Francis,	Jamesville,	Minn.	Albert E. Ebert.
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Durham, John McCurdy,	Reading,	Pa.	A. P. Durham.
Eberly, David Alexander,	Mechanicsburg,	Pa.	C. A. Eckels.
Eisenhart, Harry Pickering,	Reading,	Pa.	B. S. Gilbert.
Elm, Paris Foster,	Shippensburg,	Pa.	J. C. Attick & Co.
Faries, Wm. Edwin,	Smyrna,	Del.	L. C. Funk.



<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Fischer, Frederick Franklin,	Philadelphia,	Pa.	E. C. Vogelbach.
Fraunfelder, Jacob Adam,	Easton,	Pa.	T. E. Conard, M.D.
Furman, Jonah Hodgkinson,	Bloomsburg,	Pa.	G. B. Evans.
Furnell, Carl Burnett,	Wilton,	Me.	A. W. Pottle.
Gabler, Theodore,	Philadelphia,	Pa.	F. N. Willard.
Garcia, Juan Reyes,	Porto Rico,	W. I.	R. C. Martin.
Garver, Walter Joseph,	Hagerstown,	Md.	Chas. Ouram.
Gebhart, Ehr Gott William,	Philadelphia,	Pa.	Emil Graff.
Gibson, Hiester Franklin,	Reading,	Pa.	Dr. C. A. Weidemann.
Gillespie, Wallace Gault,	Philadelphia,	Pa.	Bullock & Crenshaw.
Gregory, Robert Nicholson,	Quincy,	Fla.	Munroe & Scott.
Grotevent, John Frederic,	Harrisburg,	Pa.	Dr. T. E. Conard.
Gruhler, Martin,	Shenandoah,	Pa.	Geo. Bille.
Guest, Deven Lovejoy,	Swedesboro,	N. J.	Guest & Guest.
Haas, Frederick William,	Nazareth,	Pa.	Dr. F. E. Himmelwright.
Haas, Wm. Arthur,	South Easton,	Pa.	A. W. Richards.
Hahn, Moses Alexander,	Mobile,	Ala.	J. S. Hawkins.
Haney, Mary Augusta,	Eastport,	Me.	J. Grady.
Hall, Thomas Murphy,	Middletown,	Del.	Howard Knight.
Harden, MacThompson,	Philadelphia,	Pa.	L. Hayburst.
Harms, Herman,	Salt Lake City,	Utah.	W. A. Nelden.
Harrold, Wm. Henry,	Conshohocken,	Pa.	Dr. J. M. Bradford.
Hart, Joseph Aloysius,	Philadelphia,	Pa.	D. S. Jones.
Hatton, Thomas Mifflin,	Philadelphia,	Pa.	G. B. Evans.
Healy, Joseph,	Philadelphia,	Pa.	J. T. Shinn.
Heckler, Franklin Jacob, Jr.,	Columbia,	Pa.	R. S. Brugh.
Heim, William Joseph,	Philadelphia,	Pa.	E. Yongmann.
Helm, Robert Proctor,	Philadelphia,	Pa.	Nolte & Reimann.
Hess, Miles Roscoe,	Hellertown,	Pa.	M. S. Apple.
Hickman, Thomas Elwood,	Wayne,	Pa.	W. H. Hickman.
Hilpert, William,	Philadelphia,	Pa.	Dr. J. J. Beyer.
Hinkle, Samuel Wisler,	Columbia,	Pa.	P. S. Brugh.
Holcombe, David Hamilton,	Bridgeton,	N. J.	A. T. Sellers.
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Jackel, John Otto,	Philadelphia,	Pa.	G. D. Jones.
Jacoby, William Lawless,	Philadelphia,	Pa.	Bullock & Crenshaw.
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Janish, William,	Philadelphia,	Pa.	F. H. Davis.
Jenkins, Holliday Green,	Wyoming,	Del.	Dr. A. F. Tod.
Jones, Henry Abner,	Lansford,	Pa.	Kennedy & Burke.
Jones, Lister David,	Manchester,	Ia.	Wm. Procter, Jr. Co.
Jones, William Willets,	Williamsport,	Pa.	Dable & Connell.
Kauffman, John William,	Norristown,	Pa.	W. H. Hickman.
Kaye, Emma Louisa,	Philadelphia,	Pa.	John Kaye, M.D.
Kearney, William,	Ireland,		J. P. Maller.
Keefer, Edgar Cyrus,	Chambersburg,	Pa.	Cressler & Keefer.
Kelley, Thomas John,	Philadelphia,	Pa.	Dr. A. F. Tod.
Kennedy, Edwin Russell,	Zanesville,	O. W. M.	Chappelear & Son Co.
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Ketterer, Martin,	Philadelphia,	Pa.	M. S. Sonntag.
Keyes, Minor Ellory,	Gravity,	Pa.	R. C. Cadrous.
Kinsey, Joseph Samuel,	New Philadelphia,	O.	F. C. Miller & Son.
Kirk, John Hammond,	Chester,	Pa.	E. T. Byrne.
Kirk, L. R., Jr.,	Rising Sun,	Md.	L. R. Kirk.
Kirk, Samuel Bird,	Curwensville,	Pa.	J. T. Shinn.
Kirchhoff, Harry C.,	Bridgeton,	N. J.	T. C. Tomlinson.
Kloop, Lewis Calvin,	North Heidelberg,	Pa.	Dr. P. P. Kloop.
Knoop, Edgar T.,	Troy,	O.	G. F. Parsons.
Koch, Harry Warren,	Bethlehem,	Pa.	J. A. Jeffries.

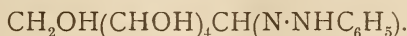


<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Kocher, David George,	Balliettsville,	Pa.	Dr. Urquhart.
Koeppen, Albert Charles,	Sioux Falls,	S. D.	L. T. Dunning.
Kogelchatz, John William,	Warrensburg,	W. Va.	J. Barclay Hall.
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Kottcamp, Abraham Francis,	York,	Pa.	G. H. Ischler.
Kottka, Ray Weaver,	Philadelphia,	Pa.	D. L. Stackhouse.
Kramer, Jesse Ray,	Williamsport,	Pa.	M. Huber.
Kunkel, Daniel,	New Ringgold	Pa.	A. S. Emery.
Kyner, Thomas Kennedy,	Orrstown,	Pa.	J. A. Kyner.
Lamar, William Robinson,	Augusta,	Ga.	S. C. Durban.
Lammer, Henry Bruner,	Philadelphia,	Pa.	Smith, Kline & French Co.
Lawall, Chas. Herbert,	Bloomsburg,	Pa.	Moyer Bros.
Leh, George Dodson,	Bethlehem,	Pa.	Dr. C. B. Lowe & Co.
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Lloyd, Richard Louis,	Philadelphia,	Pa.	Bullock & Crenshaw.
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Long, James Grier,	Coatesville,	Pa.	Thos. Coskinson, Jr.
Lower, George Grafley,	Philadelphia,	Pa.	French Cair & Co.
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Lynch, Edmund Thomas,	Wilmington,	Del.	
Martin, Merry Omah,	Wesson,	Miss.	L. P. Bloom.
Megert, George Emory,	Granburg,	Tex.	E. Megert.
Meink, Fred. Wm.,	Cleveland,	O.	Mayell Hopp Co.
Melick, Ralph Lashelle,	Sunbury,	Pa.	Dr. L. G. Bauer.
Meller, Joseph Adolph,	Galena,	Ill.	H. B. Morse.
Metzger, George Franklin,	Bethlehem,	Pa.	E. P. Unangst.
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Miller, Roshier,	Honeybrook,	Pa.	Dr. C. H. Freichler.
Mintonye, Byron Amzy,	Havanna,	Ills.	Dr. G. D. Jacquess.
Missildine, Arthur Huntington,	Winterspark,	Fla.	C. F. Pankinn.
Mohr, Frank Martin,	Philadelphia,	Pa.	D. Milligan.
Mooradian, Thomas Mooshake,	Belter, Turkey in Asia,		C. G. A. Loder.
Morris, Charles Henry,	Loganton,	Pa.	H. L. Stiles.
Mundorf, Harry Kenipton,	York,	Pa.	G. W. Fulmer.
Myers, Henry Joseph,	Philadelphia,	Pa.	J. B. Cook.
Myers, Louis Joseph,	Conshohocken,	Pa.	George Carnan.
McCoy, Cornelius Joseph,	Conshohocken,	Pa.	T. F. McCoy.
McCracken, Edward Glover,	Philadelphia,	Pa.	Jesse W. Pechin.
McCreight, Charles,	Philadelphia,	Pa.	Robert McNeil.
MacDermott, Sarah,	Media,	Pa.	G. C. Webster.
McFarland, Robert,	Philadelphia,	Pa.	W. V. Stansbury.
McHale, Frank Patrick,	Dunmore,	Pa.	M. A. Starr.
McLaughlin, Raphael,	Philadelphia,	Pa.	J. Wyeth & Bro.
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Newton, Robley Dungleison,	Towanda,	Pa.	C. B. Porter.
Neville, William,	Conshohocken,	Pa.	H. K. Kroh.
Nick, William Herman Frederick,	Erie,	Pa.	W. F. Nick.
Nichols, Albert Spencer,	Syracuse,	N. Y.	F. W. E. Stedem.
Nolan, Daniel Andrew,	Southington,	Conn.	Millton Campbell & Bro.
Noon, Edward John,	Philadelphia,	Pa.	L. Genois.
Osborne, Albert Edgar,	Wallingford,	Pa.	Wardle Ellis.
Parvin, Harry Rocap,	Bridgeton,	N. J.	A. S. Elwell.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Pashlay, Frederick Henry,	Bridgeton,	N. J.	G. H. Whipple.
Paullin, George Lambert,	Shiloh,	N. J.	H. S. Seeley.
Pazmiño, Francisco,	Ecuador,	S. A.	Dr. H. D. Harmany.
Paxson, Elmer May,	Philadelphia,	Pa.	H. J. Batdorff.
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Peterson, Walter, Vickerstoff,	Philadelphia,	Pa.	C. W. Shull.
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Powder, John Arthur,	Oerstown,	Pa.	E. Ruth.
Price, Harry Dunhaven,	Independence,	Mo.	Frank Price.
Pyfer, Howard F.,	Lancaster,	Pa.	C. A. Heinitsch.
Quick, Benj'n Chamberlan,	Port Jervis,	N. Y.	D. H. Ross.
Reap, Edgar August,	Pittston,	Pa.	Joseph Feldman.
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Reeser, William Howard,	Reading,	Pa.	L. P. Bowers.
Regan, Wayne Schaeffer,	Denver,	Pa.	W. L. Matthews.
Reh fuss, Jacob H.,	Eaton,	O.	J. B. Moore.
Reifsnyder, David Ernst,	Edgehill,	Pa.	Dr. W. E. Donough.
Reinoehl, David Vogt,	Lebanon,	Pa.	J. H. Garman.
Rice, Thomas Jackson,	Lexington,	Va.	J. T. McCrieme & Son.
Rickert, William McKinstry,	Philadelphia,	Pa.	W. F. Sieler.
Riegel, Charles Heber,	Reading,	Pa.	C. J. V. Fries.
Robeck, Louis,	Cleveland,	O.	J. W. Deutsch.
Rogers, John Wilson,	Independence,	Mo.	C. J. Gebauer.
Rothrock, Harry,	Bethlehem,	Pa.	Van Buskirk & Apple.
Rothwell, Walter,	Hatboro,	Pa.	J. W. Frey.
Ruete, Otto Moyer,	Dubuque,	Ia.	T. W. Ruete.
Ruff, W. Gilbert,	Bryansville,	Pa.	S. E. R. Hassinger.
Rnge, Oscar Gustav,	Lincoln,	Ill.	F. A. Gallenkamp.
Sage, Thomas,	Philadelphia,	Pa.	Bullock & Crenshaw.
Sahn, John Louis,	Dubuque,	Ia.	T. W. Ruete.
Sams, James,	Warrensburg,	Mo.	J. D. Eads & Co.
Saybolt, George Henry,	Philadelphia,	Pa.	W. E. Supplee & Bro.
Scheirer, Victor Daniel,	Allentown,	Pa.	A. B. Wenrick.
Schmerker, Charles Frederick,	Allentown,	Pa.	G. K. Binkley, M.D.
Schmickle, Charles Franklin,	Nazareth,	Pa.	J. H. Munson.
Schnuer, George John,	Cleveland,	O.	D. J. Sherwood.
Schuster, Joseph Barnard,	Egg Harbor City,	N. J.	Wm. Wright.
Scull, James Irvine,	Atlantic City,	N. J.	A. D. Caskaden.
Seiffert, Frank Morris,	York,	Pa.	B. S. Gilbert.
Sellen, Edward S.,	Davenport,	Ia.	C. F. Jappe & Co.
Sellers, Oscar William,	Windsor Castle,	Pa.	G. W. Fehr.
Shallcross, William Gooding,	Locust Grove,	Md.	C. B. Hunterson.
Shannon, Ogden Kelly,	Eastland,	Tex.	S. C. Downtain.
Sharp, William Walls,	Harrington,	Del.	Z. C. Fleming.
Sheppard, John Ware,	Cedarville,	N. J.	H. C. Blair's Sons.
Shimer, Arthur Buxton,	Martin Creek,	Pa.	L. Oliphant.
Shimer, Miles,	Philadelphia,	Pa.	J. D. Bishell & Co.
Siegfried, Howard Joseph,	Nazareth,	Pa.	E. M. Boring.
Simmis, Jr., Otto,	Philadelphia,	Pa.	W. A. Rumsey.
Smink, Robert Wilson,	Shamokin,	Pa.	W. H. R. Smink.
Smith, D. Evans,	Millville,	Pa.	H. C. Smith, M.D.
Smith, Joseph Vanest,	Smyrna,	Del.	R. W. Cuthbert.
Smith, Robert Victor,	York,	Pa.	Dale, Hart & Co.
Smyser, Willis Lanius,	York,	Pa.	Chas. Shivers.
Sorber, Lewis Samuel,	Falls of Schuylhill,	Pa.	J. T. White.
Stanger Laurence Albertson,	Frankford,	Pa.	O. H. Stermer.
Steere, Frederick Eugene,	Petersburg,	Va.	Steere, Wells & Co.
Steele, John Wesley,	Easton,	Pa.	Geo. J. Pechin.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Steltz, Harry Smoyer,	Pottstown,	Pa.	Dr. C. Trego.
Stewart, John,	Philadelphia,	Pa.	Geo. D. Borton.
Stratton, James Pennington,	Woodstown,	N. J.	Borton & Andrews.
Stiles, Wm. Hulbert,	Camden,	N. J.	E. C. Jones.
Storie, Wm. A.,	South Chester,	Pa.	
Stroup, Clement Bryant,	Elizabethville,	Pa.	Dr. J. C. Stroup.
Sutton, John Dorrance,	Wilkesbarre,	Pa.	Dr. C. W. Spayd.
Taylor, Howard Davis,	Smyrna,	Del.	N. Davis.
Taylor, William Francis,	Philadelphia,	Pa.	Wilmot Hansell.
Terne, Henry Bruno,	Philadelphia,	Pa.	Bullock & Crenshaw.
Thayer, Houston Talbot,	Chattanooga,	Tenn.	Voigt Bros.
Thompson, Joseph Brinton,	Cochransville,	Pa.	Dr. Henderson.
Traut, Elmer,	Philadelphia,	Pa.	G. W. Shnigh.
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Utech, Philip Henry,	Meadville,	Pa.	J. G. Lindeman.
Ullmann, George Andrews,	Philadelphia,	Pa.	J. L. Curry.
Van Buskirk, Thomas Franklin,	Bethlehem,	Pa.	S. L. Van Buskirk, M.D.
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Watton, Harry Hurley,	Philadelphia,	Pa.	W. H. Lacey.
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Wehler, J. Randolph,	New Oxford,	Pa.	S. P. Wright.
Weidler, Charles Lincoln,	Portland,	Or.	Bullock & Crenshaw.
Weiser, Spencer Bucher,	Millersburg,	Pa.	F. R. Weiser.
Whilt, John Henry,	Philadelphia,	Pa.	I. R. Landis, M.D.
Whiteley, Joseph C.,	Philadelphia,	Pa.	Adolph Poehner.
Whitman, Frank Ellison,	Canton,	Pa.	W. W. Whitman.
Wilcox, William B.,	Blackwood,	N. J.	Rowland Willard.
Wilkinson, Richard Powers,	Philadelphia,	Pa.	Frank Bowker.
Williams, Herbert Forrest,	Tamaqua,	Pa.	J. L. Paterson.
Wilson, John Swain,	Burlington,	N. J.	Harrison Duffield, M.D.
Winch, Howard George,	Bethlehem,	Pa.	H. L. Barber.
Wissler, Arthur John,	Edenburg,	Va.	H. C. Blair's Sons.
Woertz, George Augustus,	Philadelphia,	Pa.	W. A. Auffurth.
Wood, George Young,	Toronto,	Can.	R. W. Maris.
Yaple, Florence,	Chillicothe,	O.	S. Hayhurst, M.D.
Yerkes, Charles Mackley,	Philadelphia,	Pa.	J. R. Angney, M.D.
Young, Horace Greely,	Bristol,	Pa.	J. K. Young.
Zeller, Charles Adam,	Tremont,	Pa.	A. G. Miller.
Zimmerman, Howard Milton,	Mt. Carmel,	Pa.	E. W. Sharp.

The reagent which has proved more useful than any other in the study of the sugars is phenylhydrazine,  $C_6H_5HN \cdot NH_2$ . The compounds which it forms with glucose may be taken as representative of the group; on mixing solution of phenylhydrazine acetate with solution of glucose, water is eliminated and the residue of the hydrazine replaces the oxygen atom of the aldehyde group, thus—



On heating, more phenylhydrazine enters into the reaction, first removing two atoms of hydrogen from the next carbon atom, and then replacing the oxygen attached to this carbon in a manner similar to the first action; this gives a product of the formula—



The form of these compounds, containing one hydrazine residue, is called a phenylhydrazone, and the latter, containing two such residues, a phenylosazone; since, however, the hydrazine employed is always the phenyl compound, the prefix phenyl- is commonly dropped, and the substances are referred to as hydrazones and osazones, respectively. The hydrazones are, as a rule, soluble compounds; the osazones are but very slightly soluble, and, being crystalline substances of definite melting point, are very valuable for characterizing and identifying the sugars. A sugar can be easily regenerated from either its hydrazone or osazone.

Optically isomeric sugars are distinguished by the prefixed letters d-, l- and i-. The letter d- is used to denote those sugars which occur in nature, as most of them are dextro-rotatory, and those which are lævo-rotatory, as ordinary fructose, are shown by their behavior to belong to the same series. The optical opposites of the d- sugars are indicated by the letter l-, and the inactive substances resulting from mixing the d- and l- compounds, by the letter i-. Alcohols, acids, and other compounds have the prefix which belongs to the sugar from which they are obtained, without regard to their own activity.

Perhaps the most important branch of this work is that which relates to the artificial preparation of sugars and allied compounds which have previously been obtained only from natural sources. If dibromacetaldehyde is treated with baryta, condensation of the former occurs with elimination of bromine, and a 6-carbon sugar is formed; on conversion into the osazone and fractional crystallization



of the latter, this is separated into the osazones of two sugars named  $\alpha$ - and  $\beta$ -acrose, to denote their source. By the action of lime or some other oxides on formaldehyde, condensation of the latter is brought about and a mixture of sugars results, containing chiefly  $\alpha$ -acrose and another termed formose. This  $\alpha$ -acrose is the starting point for preparing a number of other sugars. On reduction with sodium amalgam it yields an alcohol  $C_{10}H_{14}O_6$ , which is an optically inactive form of mannitol. The latter substance, called i-mannitol, when oxidized with nitric acid gives i-mannose, isomeric with glucose, and by further oxidation a monocarboxylic acid, i-mannonic acid, is obtained. By fractional crystallization of the strychnine and morphine salts of this acid it may be separated into dextro- and lævo-rotatory mannonic acids.

On heating d-mannonic acid with quinoline it is partly converted into the isomeric d-gluconic acid, and by reduction of the latter, ordinary d-glucose is obtained. If d-mannonic acid is reduced with sodium amalgam, d-mannose is formed: from this by further reduction is obtained ordinary d-mannitol. If d-mannose is heated with phenylhydrazine acetate, an osazone is formed identical with that obtained from glucose; if this osazone is treated with strong hydrochloric acid, the hydrazine is regenerated and a substance is formed having the formula  $C_6H_{10}O_6$ , called glucosone; this is the aldehyde of fructose, and on reduction it yields  $\alpha$ -fructose (ordinary lævo-rotatory fruit-sugar). If the osazone is prepared from glucose and treated in this way, conversion of glucose into fructose is effected.

The i-mannonic acid which is obtained with d-mannonic acid on splitting up the inactive acid by means of its strychnine salt, yields on reduction l-mannose and l-mannitol.

If  $\alpha$ -acrose is fermented by yeast, it is separated into two oppositely active substances, the lævo-rotatory component being broken up by the yeast, and the dextro-rotatory being left unaffected; the latter is found to be l-fructose, showing that  $\alpha$ -acrose is i-fructose.

On hydrolyzing the cyanhydrin of arabinose (pentose  $C_5H_{10}O_5$ , obtained by the action of sulphuric acid on acacia and other gums), a mixture of l-gluconic and l-mannonic acids is obtained. From the former l-glucose is obtained by reduction, and by mixing this with an equal quantity of d-glucose, i-glucose results, from which the inactive alcohol may be prepared. Similarly, from equal



quantities of d- and l-mannonic acids, the inactive manno- series is obtained. Fructose may be reconverted into glucose by first reducing it, when mannitol is formed; this is next oxidized to mannose and then to mannonic acid, and from the latter glucose is prepared as described above.

In addition to its reactions with sugars, phenylhydrazine has proved very useful in identifying the acids obtained from them by oxidation. It combines with acids forming compounds called phenylhydrazides, analogous to acid amides, as shown by the general formula  $\text{RCO} \cdot \text{NH} \cdot \text{NHC}_6\text{H}_5$ . The hydrazides of the acids resulting from the oxidation of sugar are well characterized substances.

By further oxidation of the monobasic acids obtained from the hexoses (hexonic acids), dibasic acids are formed. The three glucoses give rise, respectively, to d-, l- and i- saccharic acid, galactose to mucic acid, etc. If d-saccharic acid is reduced with sodium amalgam, an aldehyde acid  $\text{COOH}(\text{CHOH})_4\text{CHO}$ , known as glycuronic acid, first results, and by further reduction of this a monobasic alcohol-acid  $\text{COOH}(\text{CHOH})_4\text{CH}_2\text{OH}$  is obtained. This acid, though represented by the same plane formula as gluconic acid, is not identical with the latter. It is termed d-gulonic acid, and the sugar obtained by reducing it is termed d-gulose. L-gulonic acid is obtained by hydrolyzing the cyanhydrin of xylose  $\text{C}_5\text{H}_{10}\text{O}_5$  (the product of hydrolysis of wood-gum), and l-gulose by reduction of the acid. The alcohol corresponding to d-glucose is d-sorbitol, and that corresponding to l-gulose is its optical isomer l-sorbitol.

A very interesting portion of this work is the formation of new sugars containing seven, eight or nine atoms of carbon in the molecule. If an aldose is acted on with hydrocyanic acid, a cyanhydrin is formed, which on hydrolysis gives a carboxylic acid containing one more carbon atom than the original sugar. The alcohol-acids so obtained very readily form lactones or internal anhydrides, and by reduction of the lactones with sodium amalgam the corresponding sugars can be obtained. Thus, from mannose, the cyanhydrin having the formula  $\text{CH}_2\text{OH}(\text{CHOH})_4\text{CH}(\text{OH})\text{CN}$  is obtained, and this on hydrolysis gives mannosecarboxylic or manno-heptonic acid  $\text{CH}_2\text{OH}(\text{CHOH})_5\text{COOH}$ , from which manno-heptose and manno-heptitol are formed by reduction; the latter is

found to be identical with the naturally occurring perseitol. By subjecting the heptose to similar treatment, octonic acid results, from which octose is prepared. In the case of the sugars derived from mannose, the synthesis has been carried as far as mannonose.

Most of the work hitherto recorded has been done on the hexoses and the sugars synthesized from them. The bioses, however, have not been neglected; by gentle oxidation of milk sugar, monobasic lactobionic acid,  $C_{11}H_{22}O_{12}$ , is obtained, and this gives on hydrolysis with dilute sulphuric acid galactose and gluconic acid; maltose yields a similar maltobionic acid, giving glucose and gluconic acid on hydrolysis. By treating glucose with hydrochloric acid, a new biose, called glucobiose or iso-maltose, is obtained.

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## THE INFLUENCE OF THE CARBOXYL GROUP ON THE POISONOUS ACTION OF THE AROMATIC COMPOUNDS.

BY W. NENCKI AND H. BAUTMY.

The researches of the authors are intended to show, on the basis of earlier as well as recent facts, that the introduction of the carboxyl group,  $CO_2H$ , into the molecule of a great number of aromatic compounds involves a great decrease of their toxic action.

As the main cause of poisoning is to be sought in reductive phenomena, the diminution of the toxic action may be explained by the consideration that it represents a group saturated with oxygen which is not further reduced in the organism. Benzon, naphthaline, pyridine, quinoline, are well known to be rather powerful poisons. Benzol- and naphthaline carbonic acids are feeble poisons, and such will be found to be the corresponding carboxyl-compounds of quinoline and pyridine. Whilst the phenols exert a powerfully toxic action this is considerably lessened in the corresponding carbon acids. Carboxyl, however, diminishes the toxic power not only in the aromatic hydrocarbons, amines, and phenols, but also in very complex aromatic compounds. Antifibrine (?) is eliminated in the urine as orthoxycarbonil, the sulpho-salt of which possesses, according to Demme, a considerably poisonous action. The corresponding orthoxyl-carbonil-carbonic acid—a white crystalline substance, fusible at  $300^\circ$ , and very sparingly soluble in the

ordinary solvents, has no poisonous effect upon dogs even in daily doses of 5 gm. Malonanilic acid, which may be regarded as an acetanilide in which a hydroxyl of the methyl-group is replaced by carboxyl, melts at  $135^{\circ}$ ; it crystallizes in transparent laminæ, and is readily soluble in ether, alcohol and water. The sodium salt of malonanilic acid has been found perfectly inactive in febrile affections. Paraphenacetine-carbonic acid, a phenacetine substituted with carboxyl, melts at  $134^{\circ}$ , crystallizes in rhombic needles, is readily soluble in alcohol, but sparingly in water. Whilst phenacetine exerts well-known characteristic effects, capable of therapeutic utilization, phenacetine-carbonic acid is perfectly inert.—*Archiv. de Science Biologique de St. Petersburg*; *Chemiker Zeitung*; *Chem. News*, Sept. 30, 1892.

## PROTEIDS.<sup>1</sup>

BY EDMUND WHITE, B.Sc., F.I.C.

The term proteid includes a very large number of substances universally distributed throughout the animal and vegetable kingdoms and intimately associated with living matter. Elementary analysis shows that they contain carbon, hydrogen, oxygen, nitrogen and sulphur. It further shows that the proportions in which these elements combine to form proteid substances vary, within certain limits, in different members of the group, the usual range being .

Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.
p.c.	p.c.	p.c.	p.c.	p.c.
50-55	6.5-7.5	20-24	15-17	3-2.4

Proteids were formerly known as "albumins" or "albuminoids." It is better, however, to use these terms in a more restricted sense, the term albumin being reserved for one variety of proteid, and albuminoids for a group of bodies related to proteids, including such substances as gelatin and mucin though differing from proteids in constitution and physiological significance. Proteids constitute an essential constituent of our food stuffs. They are present in every living animal and vegetable cell and consequently are always present in our food. The general proteid reactions may be demonstrated on a solution of white of egg which contains about 12 per cent. of

<sup>1</sup> Read before the School of Pharmacy Students' Association; *Pharm. Jour. and Trans.*, Dec. 3, 1892, p. 450.

proteids. Separate the yolk of the egg carefully and place the white in a dish; cut it with scissors in all directions, in order to liberate it from the membranes in which it is enclosed. Shake up the fluid with about twenty times its volume of water, and to the solution so obtained, after separation of the membranous fragments, apply the following tests:

(1) *Xanthoproteic Reaction*.—Add strong nitric acid; a precipitate is formed which turns yellow on boiling; cool and add ammonia; the precipitate turns to an orange color.

(2) *Biuret Reaction*.—Add a little very dilute solution of copper sulphate and then sodium hydrate; a violet color is produced (certain proteids—the albumoses and peptones—give a rose-red color).

(3) Add Millon's reagent (solution of mercuric nitrate in nitric acid). A white precipitate falls which becomes reddish on boiling.

(4) To demonstrate the presence of nitrogen (i) heat some dry proteid in a test tube and suspend in the tube a piece of red litmus paper. Ammonia is formed by the destructive action of heat and changes the color of the red litmus to blue; (ii) heat the dry proteid with a piece of metallic sodium. Sodium cyanide is formed and may be detected in the usual way by means of a ferrous and a ferric salt.

(5) To demonstrate the presence of sulphur (i) repeat test 4 (i), but replace the litmus by a piece of lead acetate paper. It blackens owing to the formation of sulphuretted hydrogen; (ii) heat with caustic soda solution and lead acetate. The mixture darkens, becoming dark brown or black owing to the liberation of sulphuretted hydrogen (by the action of the caustic alkali on the proteid) and consequent formation of lead sulphide.

*Classification of Proteids*.—The chief points assisting in the distinction and classification of proteids are their solubility or insolubility in (a) water, (b) saline solutions of various strengths, (c) acids and alkalies and (d) the temperature of coagulation.

*Class 1, Albumins*.—These are soluble in distilled water, their solutions being coagulated at from 65–73° C. The following are members of this class:

*Egg Albumin*.—White of egg contains several varieties of albumin, which may be separated by fractional heat coagulation.

*Serum Albumin*.—Blood serum also contains several nearly allied



varieties of albumin. Serum albumin is not coagulated by ether, egg albumin is.

*Muscle and milk* also contain albumins.

*Vegetable Albumin.*

*Class 2, Globulins.*—Insoluble in water, soluble in dilute but insoluble in saturated saline solutions. Coagulated by heat. The following are examples :

*Fibrinogen.*—A proteid contained in blood which coagulates when blood is removed from the body, giving rise to the familiar blood-clot. .

*Vitellin.*—The chief proteid constituent of yolk of egg.

*Myosin.*—The chief proteid of lean meat or dead muscle.

*Serum Globulin.*

*Vegetable Globulins.*—Vegetable proteids are chiefly members of this group. The aleurone grains of castor oil seeds contain a globulin in a crystalline form. Jequirity seeds contain two proteids, one of which is a globulin. Both of them are intensely poisonous when subcutaneously injected, although apparently harmless when taken by the mouth.

*Snake Poison* also contains a globulin.

*Globin.*—Hæmoglobin, the coloring matter of blood, is composed of hæmatin (a pigment matter containing iron) and a globulin called globin.

*Class 3, Derived Albumins or Albuminates.*—These are insoluble in pure water or saline solutions, but soluble in dilute acids and alkalies. Their solutions are not coagulated by heat. They are called "derived albumins," because they are derived from albumins or globulins by the action of acids or alkalies. (a) Acid-albumin. By warming a dilute solution of egg albumin with dilute sulphuric acid the solution loses its property of coagulating when heated. It contains acid-albumin. By exactly neutralizing the solution with dilute solution of sodium hydrate a precipitate of acid-albumin is obtained. Excess of alkali redissolves this precipitate forming alkali-albumin—in fact, the two are mutually convertible. (b) Alkali-albumin. This is obtained by warming albumin or globulin solutions with alkalies. By exactly neutralizing the solution with dilute acid alkali-albumin is precipitated, excess of acid converting it into acid-albumin.

*Class 4, Albumoses.*—These are soluble in distilled water, and

their solutions are not coagulated by heat; they are non diffusible and are precipitated by saturating their solutions with ammonium sulphate. The last two characters distinguish them from peptones, to which they are nearly related. They are chiefly met with as intermediate products in gastric and tryptic digestion. Three varieties have been described: (1) Proto-albumose; (2) hetero-albumose; (3) deutero-albumose.

*Albumose* also occurs in snake poison. In diphtheritic membrane an albumose possessing a powerful toxic action is formed.

*Vegetable Albumoses*.—Jequirity seed contains a poisonous albumose as well as the globulin before mentioned. Albumoses also occur as constituents of aleurone grains.

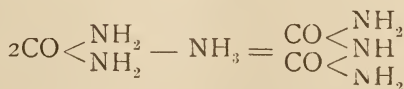
*Class 5, Peptones*.—These are the final products of the gastric digestion of proteids. Their solutions are not coagulated by heat. They are diffusible and are not precipitated by saturation with ammonium sulphate. This last property is exceedingly valuable, enabling us to separate peptones from other proteids, all the rest, albumoses included, being precipitated by saturating their solutions with this salt.

Two kinds of peptone are formed by gastric digestion (1) hemipeptone and (2) anti-peptone. Pancreatic digestion has no further action on anti-peptone while hemipeptone is further split up into simpler products which are no longer proteids, and of which leucin and tyrosin are the chief. Anti-peptone does not give Millon's reaction; the significance of this will be seen later on.

*Class 6, Coagulated Proteids*.—This term is applied to the coagula produced by the action of heat on solutions of albumins and globulins. Hard-boiled white of egg is a familiar example. They are insoluble in water and saline solutions; in acids and alkalies they are partially soluble, but only by long-continued digestion.

*Constitution of Proteids*.—Very little is known about the constitution of proteid molecules, except that they are exceedingly complex and liable to change under comparatively slight external influences. Probably peptones have the simplest constitution. They are derived from all the other proteids by the action of ferments—an action always accompanied by hydrolysis—and from analogy with the sugars derived by a similar process from the more complex starch molecule it may be supposed that they have a simpler constitution and smaller molecular weight than the other proteids, from which they are

derived. Moreover, any further change produced by chemical or fermentative action on peptones results in the formation of simpler bodies, mostly of known composition, which are no longer proteids. The chief obstacle in the way of a correct determination of proteid molecular weight is the difficulty of obtaining a quantity sufficient for analysis in an absolutely pure condition. They are so liable to change that the ordinary methods of determining molecular weight are not applicable. Attempts have been made to determine their molecular weight by the analysis of compounds with various substances. The facility with which proteids combine with these substances in various proportions tends to discredit the belief that they are true chemical compounds. For instance, the formula  $C_{204}H_{322}N_{52}O_{66}S_2$  has been proposed for egg albumin from the analysis of a copper compound formed when copper solutions are added to neutral solutions of the albumin. From the relative quantities of sulphur and iron contained in carefully purified crystals of hæmoglobin from horses' blood the formula  $C_{680}H_{1098}N_{210}S_2O_{241}$  has been calculated for the proteid constituent globin. Compounds of magnesium, sodium and calcium with the globulins from the proteid crystals of seeds have also been analyzed and the formula  $C_{292}H_{431}N_{90}O_{83}S_2$  derived therefrom. Whether or not any of these formulæ are true or near the truth it is certain that the proteid molecule is large and complicated. This is shown by the great number and variety of decomposition products which proteids yield when subjected to various reagents. In addition to simpler bodies the following may be mentioned: glycoll, leucin, aspartic acid, glutamic acid and tyrosin. By putrefactive changes indol and skatol are also produced. The general proteid reactions are probably due to various bodies produced or liberated by the action of the reagents on proteids. Thus the biuret reaction is so-called because the substance biuret yields a very similar color. Biuret may be formed by heating urea—



Cyanogen compounds are formed by further heating biuret, cyanuric acid being one. These also give the biuret reaction. Hydrocyanic acid, however, gives the pink color like peptones and albumoses. From this it has been inferred that proteids contain a cyanogen

group which, in the peptones and albumoses, resembles hydrocyanic acid, and in the other proteids which give a violet color cyanuric acid or biuret. The color produced by Millon's reagent is due to the aromatic substance tyrosin which is so readily obtained from proteids. Tyrosin is oxy-phenyl  $\alpha$ -amido propionic acid  $C_6H_4(OH)CH_2-CH(NH_2)-COOH$ . It has also been suggested that proteids are condensation products of aldehydes—aspartic aldehyde, for example. This would account for their unstable character. Another theory is that they are composed of an cyanhydrin chain united with a benzene nucleus. This accounts both for their instability and the presence or easy derivation of various cyanide groupings. Lastly, synthesis has been attempted by heating mixtures of certain proteid decomposition products with dehydrating substances like phosphoric anhydride; but up till now no real synthesis has been accomplished.

## SOME LOCAL INDIGENOUS PLANTS OF MEDICAL INTEREST.

BY JOSEPH CRAWFORD, PH.G.

Read before the Philadelphia College of Pharmacy at the Pharmaceutical Meeting, Dec. 13.

The Chairman of the Committee on Pharmaceutical Meetings evidently had the best of intentions for general good when he *ordered* the writer to prepare a paper on indigenous medicinal plants. But the present result is more in obedience to his commands than for any particular feature in botanical science of interest to the fraternity. Therefore, if it cause you any discomfiture whatsoever, we hope to find you a counter-irritant in the shape of an *Hepatica* or *Hercules' Club*, *Dogwood Bark* or an *Opuntia*, or, finally and truly, a postage stamp customer. The chairman has been liberal indeed with the limits indicated by him as to the wide field to take you through, which of itself is only fair and square, but out of the possibilities of the occasion; hence, with your permission, we will kindly look over the fence, take in one corner of the situation, thence turn on our heels and return to our homes in time for supper.

In the first place, he said indigenous, that of itself is the biggest "*Stump-in-the-field*," for the true natives are not proven conclusively to botanists to this day; hence, if there should be mentioned any that are doubtful in your minds, kindly place them with other things to the ignorance of the writer, who doubts, indeed, if he can give you any new information concerning these plants, unless it be the fact, that all can be found within a few hours' ride from the city during their respective seasons.

But would be pleased to find a desire among our pharmacists for more knowledge of the surrounding *materia medica*, if it only amounted to a speaking acquaintance with their botanical characters. Knowing the features, or having seen them, it is easy to recall them when occasion demands.



Such knowledge is easily obtained, and is not only profitable, but pleasurable in its attainment. If used properly, it is also the best advertisement you can make for your store, leading to the confidence of the public. As an illustration of its obversion, that was the losing point in "our first rush of customers," which, of course, was unexpected, we gave a man a quantity of *something* for "sage," and left him go rejoicing on his errand of relief. In our cooler moments we found that that something was not sage whatever, and never would be, so we composed ourself, as well as we could under the circumstances, to attend a funeral at short notice. But even in this we were to be mistaken; for we were new to the vicinity, positively unacquainted, and on looking at that singular sage again, found it to be only sweet marjoram, prepared for a manufacturer of sausages. Needless to add our funeral brow was laid aside then and there. Hence, we reiterate the importance of intimate knowledge of vegetable friends that you may determine the difference between white hellebore and black hellebore as clearly as between Edward Charles Jones and Charles Jones Edwards.

Well, there is nothing like starting at the beginning of things; hence, Christopher Columbus, who has the honor of discovering this New World, must have been the first white man to see an Indian turnip. History says the Aborigines met him at the shore. The greeting, therefore, was a cordial one, as any school-boy of this period can vouch for the very warm reception an Indian turnip gives even to this day, some 400 years later.

But to return to our theme, several medicinal plants are included in our flora now, because they have become widely distributed, and also form considerable lines of trade; for example, the mints, spearmint and peppermint. But we had better begin according to an accepted Manual of Botany, Dr. Gray's Pocket Edition.

We find under the order Ranunculaceæ, a veritable Virgin's Bower, *Clematis virginiana*, which is a beautiful climber in most woodlands and thickets, an attractive plant in flower and in fruit, the latter making it quite conspicuous in early summer. Although very common it receives little attention from practitioners of any school. The same can be said of *C. verticillatis* and *C. Viorna*, both found in this section.

Liverleaf, liverwort or kidneywort, *Anemone Hepatica*, is a pretty perennial plant found in nearly all upland woods or those rather dry, and is widely distributed over the Eastern United States. It is one of the earliest spring flowers we have, sends up numerous scapes, each bearing one blue flower very shortly after snows have disappeared, and were it not for the fact of the leaves being in poor condition from remaining over the winter, it would really be a growing bouquet of rare beauty. But for some reason Nature has thought fit to furnish it otherwise and the new leaves do not show themselves properly for some time after blooming. It has always seemed that this plant was destined for good in this world, principally on account of its numerous rootlets, which are large for the size of the plant, and very uniform in shape and size; they seem suggestive of concealed merit. But as far as we are able to ascertain, nothing has been tried but the leaves and they were no doubt used for liver or kidney diseases from the fancied resemblance of the leaves to the affected portion. At present the plant receives encouragement from no school, and its consumption is under a dignified name of special manufacture,

which also accounts for the sudden disappearance of more than one native herb.

In the genus *Anemone* proper several of our species have remedial virtues ascribed to them, notably *A. nemorosa* and *A. virginiana*. The former is a small vernal plant with very pretty white flowers and popularly known as wind flower from its delicate scape supporting the flower swaying with the lightest breeze. The second species is more robust, reaching nearly 3 feet in height. They are both found among old woodlands and clearings.

The genus *Thalictrum* has had representatives in medicine to a very limited extent, including also its late but near relative, *Anemonella thalictroides*, of Spach, or *Thalictrum anemonoides* of Michaux. They are simply mentioned on account of their abundance in our vicinity. A genus that is credited with having a foreign element in it, is *Ranunculus*, the buttercups of the fields. The plants are all moderately small, though some natives reach 2 feet or more in height, and some introduced species sometimes 3 feet. In this vicinity we have the following species: *Ranunculus abortivus*, *R. sceleratus*, *R. septentrionalis*, *R. repens* and *R. fascicularis*. These are credited with medicinal virtues, but outside of great acrimony not much can be expected, and the species *sceleratus* furnishes that more than any of the others. This is a frequenter of water-ways and thrives luxuriantly therein.

*Ranunculus acris* and *bulbosus* are the laddies from o'er the sea, and like other folks of upper birth are going to stay; the latter is now so common in this section of the State, that it has long since been denominated a weed; fitfully, too, as its extermination is as remote as the second youth of Old Philadelphia. *R. acris* is found further north and west.

*Caltha palustris* is another drug looming up in its golden morn among the marshes of New Jersey, and a few in this State and commonly called, therefore, marsh marigold. It is supposed to contain essentially the same principles as genus *Ranunculus*.

The king of snake roots, *Cimicifuga racemosa*, of Elliott and Nuttall, is one of our most abundant of woodland plants, and every one should be able to recognize it. Its large leaves and extended wand-like raceme of white flowers make it a conspicuous figure in late spring, and once seen they will never be forgotten, nor the plant mistaken, and his sceptre of seeds remaining throughout the season and sometimes the winter, stands a fitting emblem to his majesty's short-lived greatness. This is about the only plant in this order that can boast of noble birth, hence the reason for his apparent madness—hereditary. Surely, no foreign potentate of recent or remote age ever languished under such a category of titles, proper and common, than does this majestic bugbane of our woodlands, and after enumerating some of them, kindly note how easily rests this head that wears a crown. Linnæus and Willdenow called it *Actæa racemosa*, and it was called *Cimicifuga Serpentina*, by Pursh; *Actæa monogyna*, by Walter, *Cimicifuga racemosa*, by Elliott and Nuttall; *Actæa orthostachya*, by Wend; *Macrotys actæoides*, *M. Serpentina* and *M. racemosa*, by Rafinesque; *Botrophis Serpentina* and *B. actæoides*, by Fischer and Meyer, and *Christophoriana canadense racemosa*, by Tournefort.

Is there not a resemblance in this list to the titles of a great prince in a little principality? Hence, it is not to be wondered at that it never got out of the woods with this burden of scientific synonyms on its back, and these harsh

remarks falling on its head, hurled from local communities as bugbane, black cohosh, black snake root, rattle weed, rattle root, rattle snake root, squaw root, etc.

In explanation of those various scientific terms we would say each author cited had his reason for assigning them, and thus they have stood at variance; an instance of a trifle disagreement among botanical doctors and also a strong plea for better nomenclature. The National Formulary followed out the actæa idea in its preparation of *Syrupus Actææ compositus*, which name is very misleading to workers of the present day, and *Cimicifuga* would have been just as agreeable to handle. Dr. Darlington said of the virtues of this plant that an infusion of it was quite a popular medicine for man and beast without much regard to the nature of the disease. This does not coincide with its therapy of to-day.

*Coptis trifolia*, goldthread, does not appear in the present Pharmacopœia, a very small mountain plant with considerable tonic properties. Our only experience with it was during the convention of the State Pharmaceutical Association a few years ago at Scranton, when after a hearty dinner we had strolled away for out-door exercise prescribed for pharmacists, and shortly came upon this little stranger in great quantities. After collecting considerable and returning to the session, Prof. Maisch had just finished a paper on some interesting points; he forgave us our truancy when we gave him specimens of the goldthread.

Another plant, more robust in growth and general features, but less frequent, is green hellebore, *Helleborus viridis*, now establishing in several places near the city. It is near akin to *H. niger* of Europe. We have no aconites near us, but those remote are worthy the name and may hereafter become prominent. The same could be applied to Delphinium, coupled with suggestions for its cultivation in order to reap a harvest of silver at present prices.

*Actæa alba* is another native, frequent in moist, rocky places, but also of limited use in medicine.

*Hydrastis canadensis*, or golden seal, is not so common in our fields as in pharmacies, and our nearest station is in Lancaster County. Its value medicinally needs no comment.

The order Magnoliaceæ contains the genera *Magnolia* and *Liriodendron*. Of the former we have the recognized pharmacopœial species, *M. glauca*, as one of New Jersey's sweetest shrubs; *M. acuminata*, as a fine tree in the Alleghenies, and *M. tripetala*, or umbrella tree, along the lower Susquehanna. The first-named species is very common in Southern New Jersey, and is a deciduous shrub, but in the Southern States it is evergreen and becomes a large tree. The hunt for the umbrella tree formed one of the pleasantest occasions that will ever fall again to our lot as tramps, politely known as fern fiends.

*Liriodendron Tulipifera*, the tulip tree, or white poplar, is interesting from an historical point of view. It was described in England before the settlement of this country, and its appearance highly commented upon. One would suppose that a magnificent tree like this would have been known by various scientific names; but more fortunate than *Cimicifuga* at its feet, authorities were almost unanimous in naming it, the only dissenter having been Salisbury, who regarded the species as *procerum*. The generic name is derived from Greek, meaning lily or tulip tree, and the specific means tulip-bearing. This species

and the magnolias are pleasantly tonic, but are seldom applied now in medicine. Although the white poplar is undoubtedly one of the most erect trees of our forest, some of them are so difficult to split that a gentleman once made the remark, "You couldn't split poplar with Jersey lightning." This last article is described as a subtle fluid; but we have seen some effects of lightning on this side of the river Delaware.

That fluid may flow on as we take up a solid for digestion; the papaw, *Asimina triloba*, the only representative here of a Southern order. In the immediate vicinity it is rare, but on the Susquehanna below Columbia, among our happy hunting-grounds, it flourishes to perfection. To the novice the term papaw sounds like source of the papoid, but that is derived from a distinct tree, *Carica Papaya*. Our tree would suggest some hidden good, either as aliment or medicament, from its size, the abundance of seeds and apparent pleasantness of fruit, if nothing else. The people along the Susquehanna are still trying with their usual good taste to accustom themselves to its lack of lusciousness, but they find it like other good things hard to swallow and to retain. Several attempts have been made to introduce its principle, the alkaloid asiminine, but only with partial success.

The order Menispermaceæ has but one representative in this region, the officinal *Menispermum canadense*. The moonseed or yellow parilla is a fine climber, quite prevalent, but receives little attention from the physicians or public.

In the order Berberidaceæ we have *Caulophyllum* or blue cohosh, *Jeffersonia* or twin leaf and *Podophyllum* or mandrake. *Caulophyllum thalictroides*, so-called for its resemblance to the genus *Thalictrum*, is a beautiful plant a foot or so high, and furnished with a panicle of greenish yellow flowers. It being an officinal plant, we would invite you to a closer inspection of it when the proper season comes. *Jeffersonia diphylla* is rare in this section of the State, but found in limited places and amounts in Bucks County. *Podophyllum peltatum* is another of our woodland treasures; its pair of large umbrella-shaped leaves protecting the handsome flower and subsequent edible (?) fruit, make it desirable for beauty and general utility.

Now, we have a nosegay principally New Jersey aquatics, viz: *Castalia* or *Nymphæa odorata*, the water lily; *Nuphar advena* or spatterdock, and *Nelumbo lutea*, or yellow lotus. They are all abundant in the State named, and it seems form more lines of trade for sight and smell, than science, though we expect to hear a great deal to the contrary in the near future.

The order Papaveraceæ presents us with blooded stock, should have said rootstocks; however, blood will tell and this is not in the order of exceptions. Our native poppies though are not near enough to bring in; but friends lately from Greenland state that they flourish there; occasionally we find them in this neighborhood. *Sanguinaria* is a rival to mandrake for ground space and what blood is spilled between them is, of course, by mechanical means. This plant is most annoying to collectors for herbarium use as the parts of the flowers are very caducous, falling very early, and the leaves are not expanded till long after flowers are gone; hence, we never see a good one on paper. *Chelidonium majus* is a larger plant and it blooms for several months. It has little use here in medicine, as far as we know.

In Fumariaceæ we have *Dicentra canadensis*, or squirrel corn, a vernal



plant of fine appearance but short duration, exceedingly delicate in foliage as well as in fragrance of flowers. Species of *Corydalis* are also used as the above, principally in combination with other drugs, whereby their properties, real or supposed, are quite well concealed. The species found here are *Corydalis glauca*, *C. flavula* and *C. aurea*.

In that large order, Cruciferae, few plants are at present used, although nearly all contain virtually the same principles or constituents. Shepherd's purse, *Capsella Bursa-pastoris*, though not a native, makes its home here, and is coming out in new remedies, when we shall see what it can do.

The order Cistaceae sends us rock rose or frost weed, *Helianthemum canadense* to add to our list, but whose life history is more interesting than its therapeutical record at present. We refer to the crystals of ice shooting out from the bark of the stem at its base in late fall.

The order Violaceae has 12 species and several varieties represented in this neighborhood; but in order to get a pansy for officinal use, we must accept a little foreigner, *Viola tricolor*, sparingly introduced, but not for that purpose. Thus the number 13 proved fatal again, and our fine native species have felt pretty blue over the insult ever since.

*Geranium maculatum* is a valuable astringent drug, and it had been hoped ere this to have become more popular with our physicians. But they probably know best for general good why it is not so. It is a beautiful, common plant and delights in borders of fields and woodlands in spring. Several plants of two other genera of this order deserve mention, viz: *Oxalis acetosella* and *O. corniculata*, variety *stricta* and *Impatiens pallida* and *I. fulva*. Both genera are quite common, especially the latter, jewel weed, which can be found in nearly all wet spring places, and ranks well in size for a season's growth.

*Xanthoxylum Americanum* and *Ptelea trifoliata* are the only shrubs we have of the order Rutaceae. The former, known as prickly ash, is found in Bucks County; the latter, called wafer ash, is a very fine shrub, principally in cultivation, and has large cymes of greenish-white flowers, not so disagreeable in odor as some authorities assert. *Ailanthus glandulosa* may be put in here, not to overpower the *Ptelea*, which is an easy affair, but because it follows the others very naturally. It is used to a very limited extent in medicine. A mortal needs but to pass within several rods of this "Tree of Heaven," when in bloom, to obtain an odor that is not from "Araby the Blest," but of our foreign fumes the worst. This odor is said to be characteristic of its physiological action, extremely nauseating. We might call your attention specially to good specimens of *Ptelea trifoliata* within the city limits. They are on a small strip of land immediately at the divergence of the West Chester Railroad from the Wilmington and Baltimore branch. Here they were very abundant, but fiends of destruction have been on hand and these fine specimens will soon be gone.

Among the Hollies, or order Ilicineae, the officinal *Prinos* or *Ilex verticillata*, commonly called black alder, is widely distributed in both States, New Jersey and Pennsylvania, and forms quite an article of interstate commerce, if not more so than one of materia medica. Another species, *I. opaca*, with ever-green spiny leaves and with abundant bright red berries, tends to make our winters cheerful as well as it can.

*Euonymus* is the only genus of the order Celastraceae that yields an officinal

bark, this being derived from *E. atropurpureus*; the shrub is so much cultivated that description is unnecessary. *Celastrus scandens* belongs to the same order, and is used to some extent. It is a peculiar climber as well as twiner. The flowers are inconspicuous, but the scarlet arils of the orange fruit cluster are extremely attractive and form quite a feature of house decoration during the fall and winter.

The order Rhamnaceæ is represented by the buckthorn, *Rhamnus cathartica* in Bartram's Garden, where it was introduced as a hedge plant. *Ceanothus Americanus*, New Jersey tea, belongs to this order, and has a limited application therapeutically, and we might mention that in all our young life we have not met with the Jerseyman or woman who indulged in *this* beverage accredited to them; hence we judge it a polite appellation for a common low shrubby plant.

The order Vitaceæ, or grape family, is represented by *Vitis* or *Ampelopsis quinquefolia*, called American ivy or Virginian creeper. It is an extensive and woody creeper, or rather climber, as it conforms itself to situation and has become one of our finest natural decorations, both in summer and fall.

*Æsculus glabra*, *Æ. flava* and *Acer rubrum* belong to the order Sapindaceæ. As horse-chestnuts carried in the pocket render the person proof against rheumatic attacks, according to popular fallacy, we will simply label them: "For external use only," and carry the idea no further, unless we should call your attention to this test of a good rule—carrying a pound of prevention in the pockets for not a grain of sense in the cure. *Acer rubrum* is on the list of new remedies as red maple, and that is about all we have heard of it in that line.

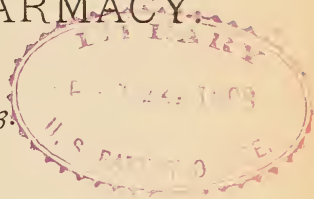
Among the Anacardiaceæ we have a list of very unpleasant companions to pass through—the sumachs. They are *Rhus copallina*, *R. glabra*, *R. Toxicodendron*, *R. typhina* and *R. venenata*. *R. typhina* is a harmless small tree; *R. glabra* a smooth shrub, and *R. copallina* also a rather smooth shrub, but with the leaflets somewhat joined. These 3 species have numerous leaflets, rather thick in texture; but the following are very poisonous: *R. venenata* has from 7 to 13 leaflets somewhat thin, is shrubby, averaging 12 feet in height, and is considered the most poisonous species. *R. Toxicodendron* is a low plant with 3 leaflets, running over the ground or climbing by rootlets over anything and everything. When it has ascended trees it becomes much stronger and throws out lateral branches in imitation of tree growth. *Rhus* poisoning is of common occurrence and the Virginia creeper is frequently censured; but if people will only remember that the creeper has 5 leaflets and *toxicodendron* but 3, the former will never be charged with the evil work of the latter.

The genus *Polygala*, order Polygalaceæ, has but one species official, *Polygala Senega*, which is found in the extreme western portion of Pennsylvania. Another species, much smaller and more pleasing than the nauseating seneka snake root, is *P. paucifolia*, or fringed polygala. It is mentioned for the sake of its beauty when in flower, and as words fail to describe a cluster of the plant at that time, we simply ask you to join us in an expedition in spring and judge for yourselves.

*Baptisia tinctoria*, or false indigo, brings us to the large order of Leguminosæ. This plant is very common with us along woodland and clearings, and is easily recognized by its bushy habit, three inversely wedge-shaped leaflets and terminal racemes of bright yellow flowers. *Cytisus scoparius* is found as

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## A RAPID ASSAY OF HYDROGEN PEROXIDE.

BY FRANK X. MOERK, PH.G.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, Jan. 17.

Hydrogen peroxide as a therapeutic agent has been known for many years, but its ready decomposition for a long time proved a barrier to its general introduction; this decomposition into water, and, for the time being, active oxygen, upon which its medicinal use depends, takes place so readily at moderate temperatures that it is impossible to guarantee the strength of the solution, even if taken from a freshly opened bottle.

Hydrogen peroxide has been called a specific in diphtheria, and other throat affections, and the responsibility of the pharmacist is apparent when the so-often fatal termination of these affections is considered; as a proof of this may be cited a case in which a physician prescribed an original four-ounce bottle of this remedy, the druggist, however, dispensing four ounces from a pound bottle opened a few days previously; the disease proving fatal, enabled the physician, apparently without an examination of the dispensed hydrogen peroxide, to insinuate that if the prescription had been dispensed as written, the patient might have recovered. Had the hydrogen peroxide by assay been found of good quality, the druggist could not have been reproached for dispensing the remedy from a pound bottle.

The practice of prescribing portions only of remedies put up in larger sized bottles, results in filling the shelves of the store, as so often the first prescription for a special remedy, also happens to be the last. The majority of cases in which hydrogen peroxide was

found inefficient, was no doubt due to the use of a decomposed article. The object of this paper is to give a method for determining the value of hydrogen peroxide, which will enable the pharmacist to make an assay in the course of a few minutes, the method is so expeditious that, if desirable, the assay can be made for each prescription, and the result noted on the prescription; as a rule, however, each bottle when opened, should be assayed, and if the demand be light, either for each prescription or about once a week so as to have a check upon the rapidity of decomposition. To the question, "What is the minimum value of hydrogen peroxide suitable for dispensing?" the answer should come from the practitioner, but the suggestion is here made that the prescription be so written as to show the volume of oxygen which the remedy should contain when it is to be used, thus enabling the pharmacist to give directions for the dilution; if this suggestion be enacted there will result greater uniformity of strength than by dispensing original packages, or by taking the specified quantity from freshly opened bottles, as this is no guarantee that the contents are of the claimed strength. The method of assay depends upon the following reaction and data:  $5 \text{H}_2\text{O}_2 + \text{K}_2\text{Mn}_2\text{O}_8 + 3 \text{H}_2\text{SO}_4 = 5 (\text{O}_2) + 8 \text{H}_2\text{O} + \text{K}_2\text{SO}_4 + 2 \text{MnSO}_4$ ; as one-half of the liberated oxygen comes from the  $\text{K}_2\text{Mn}_2\text{O}_8$ , one molecule of the latter (molecular weight 314) will liberate five atoms of oxygen (weighing 80), coming from the  $\text{H}_2\text{O}_2$ , so that 62.8 grams  $\text{K}_2\text{Mn}_2\text{O}_8$  will liberate 16 grams oxygen which, at  $0^\circ \text{C}$ . will occupy 11.16 litres or at  $20^\circ \text{C}$ . (an average temperature) almost 12 litres or 12,000 cubic centimetres; 1 cc. oxygen at  $20^\circ \text{C}$ . therefore is liberated by the use of 0.00525 gm.  $\text{K}_2\text{Mn}_2\text{O}_8$ . 2.625 gm.  $\text{K}_2\text{Mn}_2\text{O}_8$ , dissolved in sufficient distilled water to make a litre of solution, will liberate, under proper conditions, 500 cc. oxygen from  $\text{H}_2\text{O}_2$ , so that 1 cc. of this solution represents 0.5 cc. oxygen. [Solution of permanganate of potassium, containing 3 grams per litre has repeatedly been shown to be permanent for a long time (*Am. Journ. Pharm.*, 1892, 565); so there is no difficulty in keeping this solution made up, provided it be protected from dust and light.]

In using this solution it was soon found that variable results could be obtained if the assay was made in the presence of only a small quantity of water; the more rapidly the permanganate was added, the more it would take; added slowly it required less, the



explanation being that the sulphate of manganese produced has the power of decomposing  $\text{H}_2\text{O}_2$  and hence, the slower the  $\text{K}_2\text{Mn}_2\text{O}_8$  added, the greater the decomposition by the sulphate and the less  $\text{K}_2\text{Mn}_2\text{O}_8$  required. By carrying out the assay in presence of a large excess of water, reliable and uniform results are obtained; to 500 cc. water (river water will answer) in a capsule add 5 cc. dilute sulphuric acid and sufficient permanganate solution to give a pink tint (this counteracts any reducing action which the river water may have on the permanganate solution); now add 5 cc. of the hydrogen peroxide and then (from a bottle or graduate containing 175 cc.) allow the permanganate solution to run in in a thin stream, stirring constantly until the pink color is no longer discharged; the pink color after a short time is replaced by a brownish color or precipitate ( $\text{MnO}_2\cdot\text{H}_2\text{O}$ ) due to the action of manganous sulphate upon the slight excess of permanganate; measure the permanganate solution remaining in the bottle or graduate and divide the permanganate used by 10, the result will be the volume of oxygen liberated by one volume  $\text{H}_2\text{O}_2$ .

To dispense entirely with the metric system, a solution can be made by dissolving 38.5 grains potassium permanganate in a quart of distilled water (this solution (0.264 per cent.  $\text{K}_2\text{Mn}_2\text{O}_8$  is almost of the same strength as the one just described containing 0.2625 per cent.  $\text{K}_2\text{Mn}_2\text{O}$ ; one fluidrachm of the permanganate solution liberates one-half fluidrachm of oxygen at  $20^\circ \text{C}$ . In the assay the following measures should be substituted for the ones described: one fluidrachm each of hydrogen peroxide and dilute sulphuric acid, one pint river water and then add the permanganate solution from a bottle or graduate containing four fluidounces; the number of fluidrachms of permanganate solution used divided by 2 gives the volume of oxygen liberated by the  $\text{H}_2\text{O}_2$ .

Five cc. of a sample opened several times during three months required 38 and 36 cc.  $\text{K}_2\text{Mn}_2\text{O}_8$ , showing 3.8 and 3.6 volumes; one fluidrachm of the same sample required 7,  $7\frac{3}{4}$  and  $7\frac{3}{4}$  fluidrachms permanganate, or 3.5, 3.8 and 3.8 volumes oxygen (the first assay was made in presence of only 2 ounces of water).

An original  $\frac{1}{2}$  lb. bottle, purchased in a retail store, by assay, using the chlorinated soda method (Am. Journ. Pharm., 1892, 126) and measuring the evolved oxygen, gave 12.5, 12.4 and 12.5 volumes oxygen; there was no pressure in the bottle when opened,

showing that no decomposition had taken place after bottling. The  $\text{H}_2\text{O}_2$ , labelled as 15 volumes, therefore contained less than was claimed before bottling. This sample tested by the permanganate method gave 12.7 and 12.8 volumes; three days later 12.85 volumes. The slightly higher results by this method are very probably due to the permanganate not being standardized, the solution being made from commercial crystals; but for the use of the pharmacist the method combines sufficient accuracy with rapidity, and these are the requirements.

Another sample (1 lb. bottle) upon opening gave evidence of slight pressure, indicating very probably some decomposition; assayed at once it yielded 12.8 volumes; after five days no change had taken place. The temperature of the room in which the solutions were kept was never above  $20^\circ\text{C}$ . and very frequently considerably below this temperature, so that as far as the temperature was concerned little alteration in the strength of the samples was to be expected. The bottles were frequently opened and portions of the peroxide removed during the time between the various assays.

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## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*Pulverulent medicinal soaps.*—Dr. P. J. Eichhoff recently recommended the use of this class of soaps, because of the ease with which medicinal substances could be incorporated. By boiling soda solution and beef suet together a neutral soap is produced which is placed upon the market as a fine, anhydrous although hygroscopic powder; this forms the basis for all of the soaps and is called *neutral soap-powder base*; by the addition of 2 per cent. oleic acid, and 3 per cent. lanolin, a base is obtained, containing *free or excessive fat*; by the addition of 2.5 per cent. each of potassium and sodium carbonates are *alkaline soap-powder base* results. The following preparations may be incorporated with anyone of the three bases: 20 per cent. pumice stone; 10 per cent. sulphur, balsam of Peru, chlorinated lime, chrysarobin; 5 per cent. salicylic acid,  $\beta$ -naphthol, camphor, borax, pyrogallol, menthol salol, tannin, thiol, naphthalin; 3 per cent. benzoin, iodoform, iodol; 2 per cent. thymol, iodine, aristol, euophen, quinine sulphate; 0.2 per cent. cantharidin. More than one medicinal ingredient may be used as

is indicated by the following: Salicylic acid and resorcin, 5 per cent. each; salicylic acid and sulphur, 5 per cent. each; salicylic acid, resorcin and sulphur, 5 per cent. each; camphor, 2 per cent. and sulphur, 5 per cent.; camphor, 2 per cent. sulphur, 5 per cent. and balsam of Peru, 10 per cent.;  $\beta$ -naphthol and sulphur, 5 per cent. each; mercuric chloride, 2 per cent. and sodium chloride, 1 per cent.—(*Therap. Monatsh*) *Pharm. Ztg.*, 1892, 736.

*Cancroin* is obtained by Dr. Adamkiewicz from cancer tissue, upon which *Coccidium sarkolytus* is parasitic. Cancroin is a functional product, and as such presents protection against the parasite itself. It has a remarkable similarity, physically and physiologically, to the ptomaines, especially to *neurine*, and the latter could replace cancroin in its specific action towards the cancer-cell; it is possible that the two substances are identical. This name *cancroin* is not only given to the poison in the cancerous tissue, but also to a solution containing 25 per cent. *neurine* neutralized with citric acid, then saturated with carbolic acid and, lastly, diluted with twice its volume of water.—*Pharm. Ztg.*, 1892, 755.

*Artificial camphor*.—Terebenthen, obtained in the distillation of turpentine, is saturated with hydrochloric acid gas; the two isomers produced, one solid, the other liquid, are separated, as only the former is available for the production of camphor. This is then mixed with an alkaline carbonate, and heated in a still to about  $120^{\circ}$  C. to produce and vaporize the hydrocarbon, camphene,  $C_{10}H_{16}$ ; in the form of vapor, camphene is acted upon by ozone or ozonized air, whereby the hydrocarbon takes up oxygen, forming camphor,  $C_{10}H_{16}O$ . The camphor is compressed, melted or subjected to distillation.—(German Patent), *Pharm. Ztg.*, 1892, 756.

*Commercial basic bismuth salicylate*.—The variable composition is seen from the analyses of six brands, made by Dr. F. Goldmann. The moisture and free salicylic acid varied between 0.11 and 5.07 per cent., and the bismuth oxide between 57.84 and 72.34 per cent. Two of the salts contained 11.93 and 20.20 per cent., respectively, of bismuth subnitrate. The recommendation is made that future Pharmacopœias give processes for making the salt so as to insure a more uniform product.—*Pharm. Ztg.*, 1892, 797.

*Alkalinity of sodium acetate*.—The varying statements regarding the reaction of sodium acetate in aqueous solution led Dr. F. Colli-

schonn to prepare sodium acetate from perfectly neutral and also from distinctly acid solutions; the action towards litmus paper and even towards phenolphthalein proved that the solution of the salt is *alkaline* to both indicators and that the salt could contain small quantities of free acetic acid without changing the result. In the titration of acetic acid with sodium hydrate solution neither of these indicators will give *exact results*. Fifty grams sodium acetate (containing no free acetic acid) dissolved in 50 grams water required in cold solution 1 cc.  $\frac{n}{10}$  hydrochloric acid to give neutral reaction towards phenolphthalein; if the solution be boiled, 3 cc. more of the acid must be added to give neutral reaction. The addition of 4 cc. acid to this solution still gave a liquid having alkaline reaction tested with litmus or turmeric paper. To test the acetate for carbonate it is recommended to dissolve 10 gm. of the salt in 100 gm. of water, and add 1-2 drops phenolphthalein solution; in the absence of carbonate of sodium one drop *n*-hydrochloric acid will decolorize the solution.—*Chemiker Ztg.*, 1892, 1921.

*Cholera-culture reaction*.—If to a cholera-culture in gelatin or beef-tea a small quantity of concentrated sulphuric acid be added a red coloration appears, frequently called the cholera-red reaction. A study of the conditions of the reaction shows it to be due to the action of *indol* upon *nitrous acid* produced by the reducing action of the comma-bacillus from nitrates present in the nourishing medium. A series of experiments prove that this cholera test is superior to other known tests for nitrous acid (diphenylamine, sulphanilic acid and naphthylamine, and potassium iodide, starch and hydrochloric acid). The red color with the cholera-culture is interfered with by an excess of pepton, the presence of 2 per cent. pepton completely preventing the coloration, but upon the addition of a little *nitrite* it becomes apparent. The larger the quantity the *indol* present the deeper red the color, small quantities of nitrite answering as well as larger quantities. As a test for *nitrous acid* in the presence of considerable organic matter, *indol* in the presence of sulphuric acid forms the most delicate test.—M. W. Beyerinck (*Centralbl. f. Bakt., etc.*), *Apotheker Ztg.*, 1892, 666.

*Action of hydrogen sulphide upon the organism*.—By an elaborate investigation is established that the inhalation of 0.07 per cent. to 0.08 per cent.  $H_2S$  in the atmosphere produces in man, in the



course of a few hours, very dangerous symptoms; the presence of 0.1 to 0.15 per cent. causing death quite rapidly. The odor of  $H_2S$ , if present to the extent of 0.02 to 0.03 per cent. is not as powerful and unpleasant as if present in smaller quantity. 0.015 per cent.  $H_2S$  in the air can be inhaled for some hours without detriment; but more than 0.02 per cent. produces injurious effects. The system cannot be made to tolerate this gas; on the contrary, it becomes more sensitive upon repeated inhalations.—K. B. Lehmann (*Arch. f. Hygien.*), *Apotheker Ztg.*, *Repert.*, 1892, 108.

*Tests for phenacetin, methacetin and hydracetin.*—Saturated, aqueous solutions of *phenacetin* and *methacetin*, diluted with an equal volume of chlorine water, upon addition of a few drops of ammonia develop a red or brown color; the color with methacetin develops quicker and is more intense than with phenacetin. The addition of 5–10 per cent. quinine sulphate to these substances produces in the test a beautiful blue color; the test succeeds best if about 0.1 of the mixture be agitated with 5 cc. water, 8–10 drops chlorine water, and lastly, 2–3 drops ammonia water be added. Hydracetin with chlorine water gives a yellow color, intensified by the addition of ammonia; in the presence of the quinine sulphate a fine red color results. Other substances like acetanilid and exalgin themselves give no coloration, and in the presence of quinine sulphate give only the green color due to the latter; morphine, which with chlorine water alone or with ammonia, gives a yellow coloration in the presence of quinine sulphate, develops only a green color.—T. Gigli; *Chemisches Repert.*, 1892, 368.

*Tolypyrine.*—This derivative of antipyrine is *p*-tolyl dimethylpyrazolon, and differs from antipyrine by containing an additional methyl group introduced into the phenyl radical. This compound unites with salicylic acid just as does antipyrine (to form salipyrine) and the resulting salt is commercially called *tolysal*; it forms colorless crystals melting at 101–102° C., difficultly soluble in water, but easily soluble in alcohol.—*Pharm. Ztg.*, 1892, 750 and 764.

*Cinchona assay*—As an improvement upon Haubensack's method (*Am. Jour. Pharm.*, 1891, 347) which by Wegmüller was pronounced to be the best method yet proposed, C. Kürsteiner publishes the following and invites comparison of the two methods: 20 grams cinchona in very fine powder are placed in a flask of 400–500 cc.

capacity and moistened with 5 grams dilute hydrochloric acid (spec. grav. 1.060) and 30 grams strong alcohol; after standing for 2 or 3 hours, 15 grams water of ammonia (10 per cent.) and 170 grams ether are added, and repeatedly agitated during 5-6 hours; 100 grams of the liquid are decanted into a separating funnel of 300 cc. capacity, containing 50 grams water and 2 grams dilute sulphuric acid, sp. gr. 1.117 (or sufficient to impart an acid reaction after agitation with the ethereal solution), agitated repeatedly and then allowed to stand for at least one hour, when the aqueous layer is transferred to a beaker, warmed on a water-bath to 40° C. and returned to the separating funnel, which has been cleaned in the meantime. Ammonia water is carefully added until a distinct alkaline reaction results, and the alkaloids dissolved in a mixture of 30 grams chloroform and 10 grams ether by carefully rotating the funnel; after separating, the chloroform layer is removed to a tared flask, allowing it to filter through a small, plain filter; the extraction of the alkaloids is completed by using a second portion of solvent, 15 grams chloroform and 5 grams ether, allowing it to pass through the filter and washing the latter with chloroform. The solvent is then evaporated upon a water-bath and the residue weighed; multiplying by 10 gives the percentage of total alkaloids.—(*Schwz. Wochenschr. f. Chem. and Pharm.*) *Pharm. Ztg.*, 1892, 750.

*Preparation of pure chloroform.*—A peculiar method is proposed by R. Anschütz, depending upon the separation of salicylid-chloroform from impure chloroform. Salicylid  $C_6H_4 < \begin{smallmatrix} CO \\ O \end{smallmatrix} >$  and also *o*-homosalicylid  $CH_3 \cdot C_6H_3 < \begin{smallmatrix} CO \\ O \end{smallmatrix} >$  remaining in contact with chloroform for 24 hours, form crystallizable almost insoluble compounds with chloroform, the latter being only loosely combined, (comparable with the water of crystallization) and volatilized by very moderate heating. The compounds contain 33.24 per cent. and 30.8 per cent. chloroform, respectively, and can be kept for long periods in closed vessels. By heat the chloroform can be distilled shortly before it is to be used, enabling a guarantee for perfect purity. The salicylid and *o*-homosalicylid can be used over and over in this process. None of the impurities of chloroform have been found to form crystallizable compounds with salicylid or *o*-homosalicylid.—(*Berichte*) *Pharm. Centralhalle*, 1892, 753.

## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY. 6

*Creasote Pills.*—M. Limbo (*Four. de Pharm. et de Chim.*, Oct., 1892) recommends the following process for these pills, by which he obtains a preparation, having the odor and taste of the creasote completely masked: The creasote is mixed with about twice its weight of pulverized gum arabic, and when the liquid has been well absorbed a few drops of glycerin are incorporated with the mass.—See also Amer. Jour. Pharm., 1889, p. 559; 1890, p. 17; 1891, p. 291; and 1892, pp. 189 and 462.

*Antiseptic properties of guaiacol carbonate.*—The employment of guaiacol as a pulmonary antiseptic is prevented by its caustic and irritant properties, and the remedy can only be prescribed in small doses. This is not the case with the guaiacol carbonate, which is a well-defined, odorless, tasteless salt, insoluble in water, and has no irritant action on the mucous membranes. It is not toxic and acts as an antiseptic in phthisis; it is found in the urine a half hour after its ingestion.—J. Brissonnet, in *Rép. de Pharm.*, Oct., 1892.

*Guaiacol carbonate and creasote carbonate in the treatment of pulmonary phthisis.*—The excellent results obtained with guaiacol and creasote constitute these remedies true specifics for phthisis. But as it is necessary to resort to subcutaneous or rectal administration, in order to obtain the necessary doses, M. Chaumier (*Bull. gén. de Thérap.*, Dec., 1892, p. 519, recommends the use of the respective carbonates. He says he has administered 6 gm. a day of the guaiacol salt, while of the carbonate of creasote he has given as much as 5 gm. per day. The author prefers the carbonate of creasote to that of guaiacol, although the latter is a solid and more easily administered, because the creasote salt contains not only the carbonate of guaiacol, but also the carbonates of the other bodies present in the creasote.

*Empyreumatic oil of birch.*—By dry distillation of *Betula alba*, there is obtained an empyreumatic tarry oil, known by the name "daggett." When rectified it furnishes a slightly colored greenish oil, showing the remarkable property of dichroism. This is known in French commerce as *brown oil*. The empyreumatic oil is used in the manufacture of Russian leather, which owes its peculiar odor to the phenol present in it. In medicinal use it discolors the skin

and finger-nails, and it has been attempted to obtain a lighter and whiter oil, by rectifying the *brown* oil in a current of steam; but it is questionable whether this lighter oil is as valuable therapeutically. There exists, also, an oil known in French commerce, as Pennsylvania oil of birch, which consists largely of methylsalicylic ether.—F. Vigier, in *Journ. de Pharm. et de Chim.*, Oct., 1892.

This latter oil is not obtained from *Betula alba*, but is prepared by distilling the branches of *Betula lenta* or sweet birch, with water.—(Translator).

*Emulsion of coal tar oil as a substitute for cresyl.*—The high price of cresyl induced M. Delahousse (*Jour. de Pharm. et de Chim.*, Nov., 1892) to replace this by an emulsion of heavy coal tar oil (*huile lourde de houille*) obtained by the following formula: coal-tar oil, (density 1.05), 50; pulverized colophony, 10; soda lye (sp. gr. 1.33), 6; green soap, 10. A syrupy liquid results having the odor of cresyl, and acting like it in the presence of water. This preparation contains about 740 gm. of coal-tar oil per litre, and is equal to cresyl in antiseptic and deodorizing properties.

*Sodium paracresotate in infantile diarrhœa.*—According to Demme and Loesch (*Rev. gén. de Clin. et de Thér.*, 1892) sodium paracresotate acts as an internal antiseptic, disinfecting the stools and diminishing their frequency. The maximum doses are the following: under two years of age, 50 cgm. per day; to four years, 1 gm.; to ten years, 3 gm. It should be prescribed in small doses and gradually increased.

Demme's formula for the treatment of diarrhœa in infants is the following: Paracresotate of sodium, 0.10 gm.; tincture of opium, 2 drops; brandy, 1 gm.; syrup of acacia, 5 gm.; distilled water, 25 gm.

The simple tincture of opium might advantageously be replaced by paregoric.

*Phenacetine*, according to Hinsberg (*Bollet. chim. farm.*, 1892, 72), when finely pulverized and heated to ebullition with nitric acid (1:10) shows an orange-yellow color, by which it may be recognized, since antipyrine and antifebrine, treated in the same manner give no reaction.—*Rev. inter. de Bibliog. méd.*, Dec., 1892, 398.

*Butylhypnal.*—Bernin has combined butylchloral with antipyrine which results in a compound analogous to hypnal or chloral antipyrine.



rine, and proposes the name butylhypnal. It forms light colorless crystals, having the odor of butylchloral, and a bitter taste, is fusible at 70° C., slightly soluble in water, and very soluble in alcohol, ether, benzin and chloroform. The solution is colored red by ferric chloride and yields an abundant crystalline precipitate on the addition of picric acid. It is decomposed by alkalies, and reduces potassium permanganate.—*Union pharm.*, Oct., 1892.

*Cascarin and rhamnoxanthin*.—According to M. Phipson, the yellow, crystalline substance obtained by Leprince from the bark of *Rhamnus Purshiana* (see January number, p. 16) is identical with that from *Rhamnus Frangula*. The two substances have the same chemical formula, the same molecular composition, and the same characters. Buchner extracted rhamnoxanthin from the latter tree as early as 1853.—*Rép. de Pharm.*, Oct., 1892; see also *Amer. Jour. Pharm.*, 1886, p. 252.

*Elixir of cascara sagrada*.—Dujardin-Beaumetz (*Gaz. gynécologique*) recommends the following as a remedy for constipation: Fluid extract of cascara sagrada, 90 gm.; pure glycerin, 90 gm.; alcohol of 90 per cent., 200 gm.; simple syrup, 400 gm.; oil of orange 6 drops; oil of cinnamon, 2 drops, and sufficient distilled water for 1 litre. Dose—a wineglassful after meals.

*Tonic syrup of kola*.—If the elixir, or the wine of kola, is not well tolerated, especially by children, this excellent medicament may be administered in either of the following two ways:

(1) Ten to 50 drops of tincture of kola, in an infusion of black coffee, sweetened proportionately; or,

(2) An aromatic syrup prepared of tincture of kola, 20 gm.; tincture of vanilla, 20 drops; simple syrup, 90 gm., and sufficient distilled water for 160 gm. The dose is 15 to 30 gm. per day, according to age.

In order to avoid the insomnia, which follows the administration of the medicament in certain individuals, it should preferably be given after the mid-day meal.—*Rev. gén. de Clin. et de Thér.*, 1892.

*Estimation of volatile oils in aromatic waters*.—In an article on this subject published in the *Jour. de Pharm. d'Anvers*, Dec., 1892, Fernand Ranwez recommends the following process: In 200 ccm. of the aromatic water dissolve 60 gm. of table salt; add 40 ccm. of rectified ether; agitate well and decant the ether; repeat this treat-

ment with 40 ccm. and then with 20 ccm. of ether. Mix the etheral solutions and then pour on calcium chloride, and filter the desiccated ether, to which the washings of the calcium chloride have been added, into an Erlenmayer flask, containing 5 ccm. olive oil, and previously weighed after drying at 100° C. Then distil the ether carefully, avoiding ebullition. When the ether has nearly all distilled over, place in a drying-oven at a temperature of 35° to 40°, and aid the evaporation by drawing a current of air through the flask for five minutes.

When the odor of the volatile oil has entirely displaced that of the ether in the residue, make several weighings, placing the flask into the drying oven for 3 or 4 minutes before each weighing, and displacing the vapors by drawing in air, until the weighings remain constant; subtract this weight from the weight of the flask containing the olive oil previously taken, and the remainder is the weight of volatile oil; this it is only necessary to multiply by 5 to have the proportion of the oil per litre of aromatic water.

The following table shows the author's results working by this process:

Plants employed for the distillation.	Belgian Pharmacopœia.			French Codex.		
	Gm. per litre.	Volatile oil contained in the litre.	Average.	Gm. per litre.	Volatile oil contained in the litre.	Average.
Ceylon Cinnamon, . .	100	1'308; 1'381; 1'327	1'338	250	1'725; 1'724; 1'740	1'729
Anthemis, . . . .	200	0'425; 0'438	0'433	250	0'543; 0'520	0'536
Rose, . . . . .	400	0'1843; 0'1837; 0'1886	0'1885	1,000	0'480; 0'473; 0'418	0'457
Cherrylaurel, . . . .	—	1'325; 1'345; 1'290	1'32	—	—	—
Valerian, . . . . .	100	0'135; 0'180; 0'162	0'159	250	0'208; 0'244; 0'172	0'208
Elder, . . . . .	300	0'153; 0'165	0'159	250	0'181; 0'197; 0'204	0'194
Apium graveolens, . .	100	0'255; 0'260	0'257	—	—	—
Orange Flowers, . . .	350	0'426; 0'432	0'429	500	0'462; 0'487	0'474
Quadruple Orange Flower Water, . . .	—	—	—	1,000	0'5605; 0'5975	0'579

*Decoction of Cinchona.*—The following is M. Lambotte's process:

Make a decoction of 1 kgm. of cinchona, filter at a temperature of at least 70° C., evaporate to 400 cc. on a water-bath, and add to the cooled liquid 100 cc. alcohol, which dissolves the precipitate formed during the evaporation; now make up the volume to 500 cc., by the addition of distilled water. This liquid represents double its weight of cinchona. To make a decoction of (say) 100 gm., 5 cc. of

this extract are added to 95 cc. *boiling* water, which keeps it in perfect solution, even after cooling, and has the same appearance as that made extemporaneously, while if the liquid is added to cold water, an abundant precipitate is produced.—*Four. de Pharm. et de Chim.*, Nov., 1892.

*Ammonium chloride in the treatment of cholera.*—M. Dumontpallier, in the name of M. Marotte (*Rev. de Thér.*, Nov., 1892), mentions the following advantages of the use of this salt in the treatment of cholera: it produces a return of warmth and perspiration, also augments diuresis; one is justified in believing that it shows a way for the elimination of the toxic elements of this disease. The medicament should be prescribed in doses proportionate to the intensity of the disease, and the rapidity of the attacks in cachets or in liquid form. In addition to the medicament, a mustard bath is of advantage.

*Preparation of gold bromide.*<sup>a</sup>—Ch. Patrouillard uses the following process:

Trichloride of gold, 1 gm.; potassium bromide, 1 gm.; diluted pure sulphuric acid (1 : 10), 4.50 gm., and distilled water, q. s. On warming, this mixture it shows a very dark rose color, due to the production of gold bromide. At a slightly elevated temperature, the reaction is complete in a few moments. Allow the solution to cool and agitate several times with about 10 ccm. of ether; when the aqueous solution will be nearly entirely decolorized.

Agitate the mixed ethereal solutions with a little pure basic calcium chloride; decant carefully and evaporate the ether. Dehydration is necessary in order to obtain the final product pure. If any water was still retained by the ether, desiccate at an elevated temperature, when a portion of the bromide is decomposed. By evaporating on a heated tile, the ethereal solution does not rise to the edge of the container, and the loss is avoided which is always experienced by heating on a water-bath.—*Soc. Pharm. de l'Eure*, 1892.

*The crystalline substance present in cork.*—According to M. Kügler (*L'Union pharm.*, Nov. 30, 1892, p. 524), the crystalline substance which Istrati (*L'Union*, p. 450) extracted from cork is identical with that extracted by him from the same substance in 1884 (see *Amer. Jour. Phar.*, 1884, p. 240). Kügler reserved for this body the name *cerin*, previously proposed by Höhnelt, he having micro-

graphically proven the presence of cerin crystals in cork cells. After a number of crystallizations this product has a fusing point, constant at  $250^{\circ}$ , and responds to the formula  $C_{20}H_{32}O$ .

*Preparation of mercurial ointment.*—M. Bernhard modifies Tardy's process (*L'Union pharm.*, March, 1891), as follows:

Take of mercury, 100 gm.; bezoinated lard, 90 gm., and lanolin, 10 gm. Triturate the mercury and the lanolin; add 10 drops of castor oil, triturating again for a few moments; then incorporate 20 gm. of the benzoinated lard, triturating energetically until the mercury globules have completely disappeared, which will take about five minutes, when the rest of the benzoinated lard is added. Operated in this way, the preparation is completed in fifteen minutes, and responds to all the requirements of the Codex.—*Soc. de Pharm. de l'Eure*; see also *Amer. Jour. Pharm.*, 1889, p. 247, and 1891, p. 124.

*Paste for fixing labels on glass, porcelain and iron.*—The following is recommended in *Nouveaux Remèdes*, November, 1892, p. 1: 120 gm. of gum arabic and 30 gm. of gum tragacanth are macerated separately in a little water; the latter mixture is agitated until a viscous emulsion is formed, when the gum arabic solution is added and the whole filtered through fine linen. With this liquid are then incorporated 120 gm. of glycerin, in which 2.5 gm. oil of thyme have been dissolved. The volume is then made up to one litre by the addition of distilled water. This paste is said to possess remarkable adhesiveness, and to keep well in sealed flasks.

## ALKALOIDAL ASSAYING. *D*

BY C. C. KELLER.

Abstract from *Schweiz. Wochensh.*: f. Chem. und Phar., 1892, pp. 501 and 509, by F. X. Moerk.

The Swiss Pharmacopœia, now undergoing revision, will show a marked progress in the matter of assayed drugs and preparations, since it is the intention to give for numerous preparations accurate or at least approximate quantitative methods of examination. Of the several general assay methods, (I) Dieterich's method (mixing the drug with calcium hydrate, drying, powdering, extracting with ether, evaporating, dissolving the residue in alcohol and titrating with  $\frac{1}{100}$  *n*-hydrochloric acid, using logwood as the indicator) is opposed for several reasons: (1) The use of a fragile extracting



apparatus; (2) the difficulty in obtaining complete extraction; (3) a number of the alkaloids are easily decomposed by the calcium hydrate, especially brucine, hyoscyamine, atropine, etc.; (4) The very great difficulty in preventing the ether from carrying particles of the calcium hydrate into the ethereal solution; some of these difficulties cause a loss of alkaloids, the last-mentioned an increase in the yield of alkaloid. Dr. A. Partheil's modification of this method (*Am. Journ. Pharm.*, 1892, 521) is rather a complication of the method without correcting any of its fallacies. (II) Beckurts' and Holst's method (a modification of Dragendorff's method in which the objectionable emulsifying is prevented by extracting dilute alcoholic extract solution with three portions of chloroform of 20, 10 and 10 cc., respectively, distilling off the chloroform from the mixed chloroform solutions, dissolving the residue in warm  $\frac{1}{10}$  *n*-hydrochloric acid, filtering, washing the filter with water and titrating the solution with  $\frac{1}{100}$  *n*-alkali, using cochineal as indicator) which generally gives agreeing results, possesses also some disadvantages. (I) Although the addition of alcohol at first prevents the emulsifying, the solubility of alcohol in chloroform and hence its removal causes, especially in the third extraction, considerable trouble in separating the chloroform; (2) owing to the presence of the alcohol the alkaloid obtained is rather impure and colored; (3) numerous experiments show that the three portions of chloroform will not completely remove the alkaloid; to effect this the liquid must be extracted with chloroform until no precipitation occurs upon acidifying and adding Mayer's reagent; (4) it requires too much time. (III) Schweissinger and Sarnow's method (*Am. Journ. Pharm.*, 1891, 96) (in which a concentrated aqueous solution of the extract made alkaline with ammonia is agitated with a relatively large quantity of a mixture of chloroform and ether and then a portion only of the alkaloidal solution evaporated and weighed or titrated with  $\frac{1}{100}$  *n*-acid using cochineal as indicator; the solvent can be a mixture of chloroform and ether, which may be lighter or heavier than water as may seem desirable) after numerous series of experiments is hailed as the method containing the basis upon which future Pharmacopœias will form their alkaloidal assays; as advantages are stated: (1) That no special apparatus is required; (2) by the use of the mixed solvent no emulsion is formed; (3) the rapidity of its execution; (4) with proper modification it is suitable

not only for preparations but also for crude drugs ; (5) the comparative purity of the alkaloids ; and (6) closely agreeing results.

In referring to its general use the following statements are interesting : In assaying extracts the *quantity should not be too small*, of fluid extracts the use of 6 to 10 grams overcomes the difficulty of weighing or titrating minute quantities of alkaloid and has the advantage of allowing the use of  $\frac{1}{10}$  or  $\frac{1}{20}$  *n*-acid in titrating whereby the process is made easier. The extract must not be too concentrated, or fallacious and varying results will be obtained, whereas proper dilution insures at once correct and agreeing results. For extractions the lighter chloroform-ether mixture is preferable because allowing the use of ordinary dispensing vials and not necessitating the use of a separating funnel ; mixtures containing little chloroform, in some cases even pure ether, are recommended because of the greater purity of the alkaloid ; chloroform or mixtures containing a larger quantity of chloroform tend to extract an impurer alkaloid. The extract solution should be agitated with the alkaloidal solvent before the addition of the alkali (almost exclusively water of ammonia), as this procedure favors the solution of the alkaloid when liberated. In the majority of assays the ether-chloroform solution can be poured off clear, in exceptional cases the solvent must be passed through a dry filter, preventing loss by evaporation by covering the funnel. By placing the alkaloid solution in a weighed Erlenmeyer flask the solvent can be distilled off and the residue weighed and then titrated ; this combination of weighing the residue and titrating it, will serve to a certain extent as a check and detect the addition of cheaper alkaloids to inferior preparations of the more expensive drugs ; as an illustration is cited the addition of cinchonine to raise the alkaloidal value of an inferior fluid extract of ipecac. Attention is called to the fact that the weight of the residue always indicates a higher result than by titration ; recently Professor Norton and H. T. Nichols (Am. Journ. Pharm., 1892, 340) have proven that even by using pure alkaloids in chloroform solution an increase in weight results, and state that "the increase in weight is of importance, has as yet not been explained and that to determine the cause further investigations will be made." The explanation is very simple : The alkaloid retains some chloroform which a temperature of 90° or even 100° C. will not, or only very slowly, dissipate ; this behavior is due to

the high specific gravity of the chloroform allowing a film or layer of amorphous alkaloid to form on the surface, which then prevents the escape of the remainder of the chloroform; the last portions of the chloroform can be gotten rid of by dissolving the residue in 5 or 10 cc. ether and evaporating the ether at the temperature of the water-bath; by repeating the operation only traces of the chloroform will remain, and drying at 90–100° C. is facilitated by the amorphous alkaloid becoming crystalline. The titration of the alkaloidal residue is effected readily by dissolving in alcohol, adding water until a faint turbidity results and titrating with the acid; hæmatoxylin (1 per cent.) in alcoholic solution gives after a little practice the best results as an indicator, care being taken to add only one or two drops of the solution, otherwise difficulty is encountered in determining the end reaction.

*Assay of the fluid extract of ipecac.*—8 grams of the fluid extract are diluted with 8 grams water in an ordinary vial, 32 grams chloroform and 48 grams ether added and thoroughly agitated; 4 grams water of ammonia are next added and the mixture frequently agitated during half an hour. After separation 50 grams of the chloroform-ether solution representing 5 grams of the extract are poured or filtered into a tared flask and the solvent distilled off; the varnish-like residue is twice treated with 5–10 cc. ether and evaporated by forcing a current of air into the flask by means of a rubber bulb; after the last traces of ether have been removed and the residue dried in a water-bath it is weighed. For the titration the alkaloid is dissolved with the aid of heat in 10 cc. absolute alcohol and sufficient water added to give a permanent turbidity; after adding one or two drops hæmatoxylin solution  $\frac{1}{10}$  *n*-hydrochloric acid is added until the violet-red color changes to a pure pale-yellow. Emetine, according to Kunz, is di-acid and has the formula  $C_{30}H_{40}N_2O_5$ , mol. weight 508 (by a control experiment with pure emetine this formula was found to be correct; the older formula  $C_{20}H_{30}N_2O_5$ , however, is still to be found in some recent standard works), the equivalent weight, therefore, is 254 and 1 cc.  $\frac{1}{10}$  *n*-hydrochloric acid represents 0.0254 grams emetine. In various samples of fluid extract of ipecac made from the same drug by different methods 2.54–2.59 per cent. emetine was found.

The statement, recently published by Cæsar & Loretz (Am. Jour. Pharm. 1892, 568), that the best selected ipecac root yielded at the

most 1.85 per cent. emetine, caused the investigation to include the assay of the crude drug. The process used in the just-quoted analysis was proposed by Kremel (Am. Jour. Pharm., 1892, 519); in it the finely powdered drug is mixed with calcium hydrate and water and dried in a steam-bath before extracting with chloroform; after 6 hours' extraction 0.82 per cent. emetine, after 4 hours' further extraction 0.12 per cent. additional was obtained, or by 10 hours' extraction 0.94 per cent. emetine; various modifications of the method did not give more favorable results. The reason for the small yield of alkaloid is no doubt due to the gelatinizing of the starch and in the subsequent drying this covers the cellular tissue so that the cell contents cannot be acted upon by solvents. As a result of the experiments to devise a practical and reliable method for the

*Assay of ipecac root*, the following is offered: 10 grams of the finely powdered and dried (at 100° C.) root is placed in a dry bottle of 150 cc. capacity, 40 grams chloroform and 60 grams ether added and thoroughly mixed by agitation for several minutes; by the addition of 10 grams water of ammonia the suspended powder separates almost immediately while the emetine is dissolved; frequent agitation during one hour is followed by a further addition of 5 grams water of ammonia which upon agitation causes the powder to agglutinate into a lump, while the liquid becomes perfectly clear and if necessary could be almost completely poured off. Fifty grams of the alkaloidal solution, representing 5 grams of the dried root, is then transferred to a weighed Erlenmeyer flask and the process completed as described under the assay of the fluid extract. The titration in this case is a little more difficult because of the extraction of a little fat from the root (the average of six determinations of fat in ipecac gives 0.31 per cent.); an improvement of the assay process consists in extracting the fat from the dried powdered root before submitting it to the assay. For this purpose 10 grams of the powder are placed in a small glass funnel closed with a plug of cotton and percolated with ether until the latter runs through colorless, usually 15–20 cc. suffice; then with a glass rod the cotton and powder are pushed through the funnel into a dry, weighed bottle of 150 cc. capacity and washed with ether until the weight of the ether in the bottle equals 60 grams, then add 40 grams chloroform, etc., as before. By this preliminary treatment the alkaloid solution remains almost perfectly clear



during the titration. Assays made with six samples of ipecac root (No. 5, the root used in making the fluid extracts; No. 6, a selected Carthagena-ipecac from Cæsar and Loretz) gave the following results:

	1	2	3	4	5	6
	Per Cent.					
Emetine by weighing the residue, . .	3'032	3'078	3'148	3'028	2'620	2'700
Emetine by titrating the residue, . .	2'794	2'743	2'844	2'743	2'565	2'438
Difference between the two, . . . .	0'238	0'335	0'304	0'285	0'055	0'262

From these results a pharmacopœial requirement of 2·5 per cent. emetine in the ipecac root would not be too exacting. As the objection that the assay determines not only emetine but cholin may be raised against this method, the alkaloidal residue from 50 grams of the root was dissolved in dilute alcohol, neutralized with hydrochloric acid, evaporated to dryness and dissolved in a little water; this solution, which should contain the cholin as hydrochloric, was distilled with baryta water, but the distillate was found to be entirely free from cholin.

## CAFFEINE AND THEINE: THEIR IDENTITY AND THE REACTIONS OF CAFFEINE WITH AURIC CHLORIDE.<sup>1</sup>

BY WYNDHAM R. DUNSTAN AND W. F. J. SHEPHEARD.

From the Research Laboratory of the Pharmaceutical Society.

In consequence of the conclusions of Mayo (*Journ. Physiol.*, 7, 458; *Therapeutic Gazette*, 1866, 587) and, more recently, of Lauder Brunton and Cash (*Proc. Roy. Soc.*, 42, 283; *Journ. Physiol.*, 9, 112), that the physiological action of theine obtained from tea differs in certain respects from that of caffeine obtained from coffee, the authors have searched for evidence of isomerism in these bases, the existence of which is not put beyond doubt by the chemical comparison of them which has hitherto been made.

Having extracted theine from tea and caffeine from coffee it is shown that the two substances exactly resemble each other and melt at precisely the same temperature, viz., 234·5° (corr.). From each base the crystalline *aurochloride* ( $C_8H_{10}N_4O_2 \cdot HCl, AuCl_3, 2H_2O$ ) was prepared, and these two salts both melted at 242·5° (corr.). When dried at 100° they both lost the equivalent of two

<sup>1</sup> The substance of a communication made to the Chemical Society on December 15; reprinted from *Phar. Jour. and Trans.*, Dec. 17, 1892, p. 481.

molecular proportions of water, and the anhydrous salts melted at the same temperature, viz.,  $248.5^{\circ}$  (corr.). The analytical data corresponded with the formulæ given above. The complete correspondence in the properties and composition of the aurochlorides is satisfactory evidence of the absence of a structural difference in the bases. In order to further confirm the identity of the two substances, a specimen of each was converted into the *mercuric chloride compound* ( $C_8H_{10}N_4O_2 \cdot HgCl_2$ ), a stable crystalline salt. Both preparations were found to melt at the same temperature, viz.,  $246^{\circ}$  (corr.), and to exactly correspond with each other in other respects.

The complete identity of caffeine and theine having thus been demonstrated, the observed differences in their physiological action must be ascribed either to impurities in the specimens used, or to variations in the animals employed in the experiments. The circumstance that theine was found to be more active than caffeine, and to be capable of producing effects not produced by caffeine, tends to support the view that the theine was impure. It is now well known that tea contains other bases than caffeine, the presence of traces of which might be sufficient to account for the observed differences.

During the preparation of the pure aurochlorides for a comparison of their properties, the authors obtained two new and interesting auric derivatives of caffeine.

When an aqueous solution of caffeine aurochloride is heated, a yellow, flocculent precipitate is gradually formed, which is insoluble in alcohol, chloroform, and ether, but dissolves in hydrochloric acid, reproducing the aurochloride. The substance dried at  $100^{\circ}$  forms a pale yellow, amorphous powder, which melts at  $207^{\circ}$  (corr.). Analysis proved it to be *aurochlor caffeine*  $C_8H_9(AuCl_2)N_4O_2$ , a substance in which one atom of hydrogen in caffeine is replaced by the group  $(AuCl_2)$ . It is pointed out that the ready formation of this remarkable compound from caffeine aurochloride by the loss of two molecular proportions of hydrochloric acid— $C_8H_{10}N_4O_2 \cdot HCl, AuCl_3 = 2 HCl + C_8H_9(AuCl_2)N_4O_2$ —is better shown by Medicus' formula for caffeine than by that proposed by Emil Fischer; since in Medicus' formula the CH group which loses hydrogen is represented as contiguous to the doubly linked nitrogen atom, to which the auric chloride is attached.

By the reaction of an alcoholic solution of potassium chloraurate

(KCl, AuCl<sub>3</sub>) with a solution of caffeine in chloroform, a salt, crystallizing in dark red needles, was obtained. This is shown to be *caffeine potassium aurochloride* (C<sub>8</sub>H<sub>10</sub>N<sub>4</sub>O<sub>2</sub>, KCl, AuCl<sub>3</sub>), which differs from caffeine aurochloride in containing potassium in the place of the hydrogen of hydrochloric acid. This salt melts at 208° (corr.). It readily dissolves in alcohol and water, forming yellow solutions, which appear to contain not the salt itself, but its constituents—caffeine and potassium chloraurate. The salt is nearly insoluble in ether and chloroform, but prolonged contact with these liquids leads to its decomposition into caffeine and potassium chloraurate.

Both aurochlor caffeine and the caffeine potassium aurochloride were obtained alike from the bases derived from tea and coffee.

## DETECTION OF ATROPINE.<sup>1</sup>

BY L. FABRIS.

A patient at a hospital in Padua, who had for some time been treated by daily injections of 6 milligrams of strychnine nitrate, died a few hours after receiving an accidental injection of 3 milligrams of normal atropine sulphate, exhibiting acute symptoms of atropine poisoning. At the *post-mortem*, the presence of bilateral mydriasis, and of congestion of the meninges and of the cerebellum became evident. On examining the viscera by the Stas-Otto method, clear indications of the presence of an alkaloid were obtained, but on applying the special reactions for strychnine and atropine, the results were negative. To test the possibility of these alkaloids obscuring each other's reactions, mixtures of 3 per cent. solutions (the strength of the injections) of strychnine nitrate, and atropine sulphate were tested with sulphuric acid and potassium dichromate, and by Vitali's reaction, with the following results. A mixture of equal parts of the solutions gave the strychnine reaction very clearly, but the atropine reaction not at all; a mixture of 1 of strychnine with 3 of atropine gave the strychnine reaction, but not that of atropine; a mixture of 1 part of strychnine with 4 of atropine gave indistinct reactions for both alkaloids; a mixture of 1 of strychnine to 5 of atropine gave a momentary atropine reaction; the characteristic violet coloration is, however, immediately superseded

<sup>1</sup> *Gazzetta*, 22, i, 347-350. *Jour. Chem. Soc.*, 1892, p. 1534.

by a reddish tint. Vitali's reaction was not clearly obtained until at least 9 parts of the atropine solution were added to 1 of strychnine. It further appeared that a solution of strychnine too dilute to give the characteristic reactions of that alkaloid may effectually obscure the atropine reaction; thus 1 drop of the 3 per cent. strychnine solution diluted with 10 drops of water scarcely yields the strychnine reaction; on adding 4 drops of atropine solution to this, no reaction for atropine could be obtained.

A piece of meat injected with 0.05 cc. of a 3 per cent. solution of each of the alkaloids, and extracted by the Stas-Otto process, yielded a barely sensible strychnine reaction and no trace of atropine. Finally, on injecting a mixture of 3 parts of the 3 per cent. strychnine solution and 1 part of the atropine solution into a frog, paralysis of the lower limbs and a great augmentation of the nervous sensibility ensued; on introducing the mixture into the eye of a dog, distinct mydriasis was observed in fifteen minutes. It thus appears that in cases of poisoning by atropine, the physiological evidence may be conclusive when the chemical tests yield doubtful results.

## ON THE ACTION OF THE VOLATILE OIL OF ATHEROSPERMA MOSCHATA.<sup>1</sup>

BY RALPH STOCKMAN, M.D., F.R.C.P.E.

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The *Atherosperma moschata*, or Australian sassafras, is a tree growing in S. Australia and Tasmania, and belonging to the natural order Monimiaceæ, tribe Atherospermeæ. The literature regarding its economic and medicinal uses is by no means large. The bark has been used as a substitute for tea,<sup>2</sup> while a decoction and a tincture have been employed therapeutically.

In 1861, Zeyer<sup>3</sup> obtained from the bark an alkaloid, which he named atherospermine, but regarding the physiological action of which nothing is known. In 1862, Greeves, in a letter to the editor of the *Lancet*, states that the bark has long been used by the

<sup>1</sup> Read at an evening meeting of the Pharmaceutical Society in Edinburgh; from *Phar. Jour. and Trans.*, Decb. 24, 1892, p. 512.

<sup>2</sup> *Pharm. Jour.* [1], vol. xv, p. 115; *Amer. Jour. Phar.*, 1856, p. 73.

<sup>3</sup> *Vierteljahrschr. f. pract. Pharm*, x, p. 504; *Amer. Jour. Phar.*, 1862, p. 166.



early settlers and Bushmen in the form of a diet drink in rheumatism and secondary syphilis.<sup>1</sup> He adds that he himself and other practitioners have used it with most excellent results in acute bronchitis as a decoction (1 oz. bark to 1 pint water, boiled 10-15 minutes, dose 1-2 oz. three or four times daily), and that it acts freely on the kidneys and skin, and facilitates expectoration, while reducing the secretion of bronchial mucus. Further, that Bosisto has obtained an essential oil from the bark, and that this has been given by Dr. Hudson with marked success in heart disease. He adds that the volatile oil must be used with great caution, as a single drop is a full dose, and quotes as his authority the *Australian Medical Journal*, of October, 1861.<sup>2</sup> I have not been able to consult the reference, but Bosisto repeats the statement (*Phar. Journ.*, [3], vol. xvii, p. 417).

If the volatile oil is so active in such small dose, it must differ remarkably from other volatile oils. As I was anxious to ascertain whether this is so, I applied to Mr. E. M. Holmes and Mr. Bosisto, and readily obtained from these gentlemen a sufficient supply of the bark and its volatile oil to enable me to carry out an investigation into their physiological action.

The oil is light yellow in color, with a pleasant aromatic, slightly pungent smell and taste, not unlike oil of sassafras. On exposure to the air it tends to become thick and resinous, and its solubilities in various menstrua are similar to those of other volatile oils.

The physiological experiments which I have made with it have convinced me that it also does not differ from other volatile oils in its general action, and that there is no reason for attributing to it any specially poisonous effects.

Thus, when a frog is placed under a glass jar on the sides of which a few drops of the oil have been smeared, it at first shows signs of restlessness, but in a few minutes there ensue symptoms of marked depression of the central nervous system. It first becomes clumsy in its movements, jumps with great difficulty, and then lies quite motionless and flaccid as if dead. Respiration soon ceases, the motor nerves become paralyzed in time, but the heart goes on beating for two or three hours, finally stopping in diastole. After

<sup>1</sup> *Lancet*, i, 134, 1862.

<sup>2</sup> This statement was also made by A. Redford, in *Proc. Liverpool Chemists Assoc.*, republished in *Amer. Jour. Phar.*, 1863, p. 452.

death the muscles are quite excitable to electricity. Administration of small doses by the mouth or by subcutaneous injection gave exactly similar results. Two minims of the oil given subcutaneously is an overwhelming dose for a frog, and kills it almost at once by paralyzing the heart.

In rabbits small doses have no apparent action, but one drachm given by the mouth causes a good deal of stupor, lasting for an hour or two. The heart was not affected, but the respiration was slowed to about one-half of its original rate. Three drachms by the mouth caused death in twelve hours in complete coma, both heart and respiration being gradually and markedly depressed, especially the latter. In mammals, therefore, as in frogs, the central nervous system (spinal cord and brain) is chiefly affected.

Excretion of the oil, but considerably altered just as other essential oils are, takes place in the urine.

I have taken repeatedly doses up to 10 minims, but was unable to observe that either its local or general action differed in any way from similar volatile oils, such as oil of sassafras or of eucalyptus.

It is antiseptic, and in watery solution preserves albuminous solutions for an indefinite time.

As it was just possible that other constituents of the bark might be poisonous and impart their activity to some specimens of the oil, I made an alcoholic extract from 15 grammes of the bark and gave the whole to a rabbit without any apparent effect. Further, I thoroughly extracted 100 grammes of the powdered bark with amylic alcohol to which a few drops of ammonia had been added. The amylic alcohol was then shaken up with hydrochloric acid water, the acid solution drawn off and excess of ammonia added to it, when a dense white flocculent precipitate formed. This I took to be Zeyer's atherospermine. One-half of it was given to a rabbit, but it had not any visible action.

It seems therefore certain, that neither the volatile oil nor any other constituent of the bark of *Atherosperma moschata* is particularly active or poisonous, and further that the volatile oil has a close resemblance in physiological action to other volatile oils. Regarding its uses as a diaphoretic, expectorant and alterative, there is little doubt that it is simply similar to the many other essential oils or plants containing them which are used in medicine for similar purposes.

## NOTES ON THE EUCALYPTUS.<sup>1</sup>

BY W. C. TYNDALE, of Chicago, Ill.

The *Eucalyptus* tree is a native of Australia and Tasmania, where it forms large forests. There are about 140 species described, but they vary extremely, different kinds of leaves being produced on the same tree, thus presenting distinct specific characters, and varying also in the nature of their barks.

In Tasmania and Gippsland Victoria, they grow to an immense height, often exceeding 400 feet. Their naked and branchless stems of a dirty white color look like natural columns. These are often blackened by the fires of the natives or wrung by the settler's axe, when they afford a grand but dismal spectacle, as one speeds along in the train; in some districts square miles of country are passed in which the forests have been wrung preparatory to settlement, and in some cases for no obvious reason, as the land is unfit for occupation and there stand those former monarchs of the forest like giant skeletons, sapless, lifeless looking, dismal, and forlorn in the midst oftentimes, of a luxuriant undergrowth.

The trees are named usually according to the nature of their bark which they shed instead of their leaves, such as stringy bark (*E. obliqua*), iron bark (*E. Sideroxylon*), blue gum (*E. Globulus*), peppermint tree (*E. amygdalina*).

The wood of some is very hard and durable, and so heavy as to sink in water. Many yield a kind of resin or gum, such as *E. resinifera* and *E. amygdalina*. A volatile oil of wonderful medicinal qualities is also produced from the leaves of various kinds but more especially from that known as the *E. amygdalina*, which is the most productive, and yields nine-tenths of the oil of commerce, though not always placed in the market under its own name.

This arises from a certain amount of notoriety gained for the *E. Globulus* abroad, owing to the fact that it is the easiest of the species to acclimatize. As a matter of fact, however, there is scarcely any *E. Globulus* distilled in Australia. *E. mannifera* yields sweet secretions analogous to manna. *E. Gunnii* furnishes a liquid that ferments and forms a kind of beer. They all produce abundance of seed, which vegetates freely and becomes naturalized in various countries.

<sup>1</sup>Journal of the Amer. Med. Assoc., Jan. 21, 1893, p. 70; compare also Amer. Jour. Phar., 1876, pp. 370-375.

The *E. amygdalina* or giant eucalyptus, called "Waugara," by the natives, is also known as the peppermint tree. This is one of the most remarkable and important of all the plants in the whole creation. Viewed in its marvellous height when standing forth in its fullest development on the slopes or within the glens of mountain forests, it represents probably the tallest of all the trees of the globe. Regarded as a hard wood tree of rapid growth it ranks foremost, and contemplated in respect to its yield of volatile oil from its copious foliage it is unsurpassed and perhaps unequalled by any tree in the world. These qualities have made it become generally known and much through the exertions of Baron Von Mueller, this tree is now being introduced abroad with good results in countries neither subject to severe frosts or intense moist heat. It assumes under different climatic and geologic conditions, various forms. Thus, in the ravines of the cooler ranges it attains its greater height, combined with a perfect straightness of stem, while the bark strips so completely as to render the huge stem quite smooth and almost white.

In the more open country it is much smaller. Under these conditions it is called a "peppermint tree" in Victoria and Tasmania, and a "messmate tree" in New South Wales.

In Victoria this tree often exceeds 400 feet in height. Such trees are found on the Black Spur, Upper Yarra Yarra, and Upper Goulbourn. A fallen tree on the Dandenong Ranges measured 420 feet. The length of the stem up to the first branch was 295 feet. The diameter of the stem where it was broken 365 feet from the root was three feet.

A still thicker tree in the same locality measured 53 feet in circumference three feet from the ground.

A tree near Mount Wellington, Tasmania, has been found which measured 12 feet in diameter 220 feet from the ground. Another tree was found 130 feet in circumference at the base. Within a square mile 100 trees could be counted with a circumference of at least 40 feet. At the foot of Mount Baw Baw, Victoria, is found the highest of the giant trees of Australia. This monster is 471 feet high, and another on the Cape Otway ranges is 415 feet in height. The final height is sometimes attained by a single branch pushing skyward.

It is a grand picture to see a mass of enormous tall trees of this



kind with stems of mast-like straightness and clear whiteness so close together in the forest as to allow them space only towards the summit to send their scanty branches and sparse foliage to the free light.

The distillation of the oil was first initiated by Baron Von Mueller. *E. amygdalina* yields more oil than any of the other varieties, and is therefore almost solely employed for the purposes of distillation. It is also one of the best for subduing malarious effluvia in fever regions, although it does not grow abroad quite so well or quickly as *E. Globulus*.

The respective hygienic value of various trees may to some extent be judged by the percentage of oil in their leaves, as stated below.

	Per Cent. of Oil.
<i>E. Amygdalina</i> . . . . .	3'313
<i>E. Oleosa</i> . . . . .	1'250
<i>E. Leucoxylon</i> . . . . .	1'060
<i>E. Goniocalyx</i> . . . . .	'914
<i>E. Globulus</i> . . . . .	'719

The lesser quantity of oil in *E. Globulus* is compensated for by vigor of its growth, and early copiousness of its foliage. It readily adapts itself to other climates and hence abroad nearly all varieties of the oil are known as *Globulus*. During the last twenty years the blue gum has come into high repute as a sanitary tree. A high authority states that the sewage system of large towns in warm climes would be simplified if each house had the ever green gum tree in the back yard. The disinfecting and deodorizing virtues of the tree are unquestionable.

Flesh of any kind is as well preserved by eucalyptus as by creosote, while beef sprinkled with it will dry hard without putrefaction. It is fatal to bacteria and other microörganisms. It may be injected into the veins and arteries of cadavers for purposes of preservation. It is also a good admixture in dressing gangrene.

## PERFUME IN FLOWERS.<sup>1</sup>

*Researches upon the Mode of its Production.*

BY E. MESNARD.

The insufficient nature of the micro-chemical methods usually employed has so far prevented an exact knowledge being obtained

<sup>1</sup> Adapted from *Comptes rendus de l'Académie des Sciences*; reprinted from *Phar. Jour. and Trans.*, Jan. 7, 1893, p. 549.

of the matter in which the perfume of flowers is produced. I have applied to this class of researches a general method which has served in the localization of fixed oils. The section being placed in a drop of pure glycerin is arranged upon a round cover glass, which, being then inverted, serves as a cover to a small chamber formed by cementing a glass ring to an object slide. In the interior of the chamber is fixed another ring of smaller diameter and somewhat less in height, thus forming with the first an annular space in which the reagent may be placed. By adopting this arrangement the light passing through the central part of the cell is not modified. The inner ring will further serve to support a very small cover glass, upon which sections may be arranged which require to be exposed to the action of the reagent for some length of time, as occasionally happens in the case of the fixed oils. The reagent invariably employed is pure hydrochloric acid, the hydrated vapors from which are readily absorbed by the glycerin. In this way, by a gentle and easily regulated action, I obtain complete hydration of sections in the presence of an acid. When they have been exposed for a short time, the essential oils appear as minute spherical drops of a fine transparent golden yellow. If the action be prolonged the drops disappear, being transformed into diffusible products. The tendency of the globules is not seen in the fixed oils, so that it provides a means of distinguishing these two classes of products.

*Fasmin.*—In this flower the essence is situated in the row of epidermal cells on the upper side of the petals and sepals. Some exist also in the corresponding layer on the under surface, where the sepals are colored by a violet pigment. If the evolution of the cell contents in flowers at different stages of development be followed, at first nothing but chlorophyll is found in the tissue; tannin appears next, or rather intermediate glucosides, difficult to identify by means of the ordinary tests for these substances. These glucosides furnish the tannin and pigments of the lower surface of the sepals. The hydrochloric acid vapors distinguish all the tannoid compounds intermediate between the chlorophyll and tannin or pigments on the one hand, and between the chlorophyll and essential oil on the other. The explanation of these facts seem to be as follows: Whereas upon the lower surface of the bud, which was exposed to the action of light and the oxygen of the air, the tannoid compounds were slowly oxidized and gave rise to tannin, upon

the upper surface which was hidden in the bud these agencies were inoperative, and the same compounds were converted into essential oil, which oxidizes in contact with the air and produces the sensation of perfume.

*Roses.*—The essence in roses is found in the papilliform epidermal cells<sup>1</sup> on the upper surface of the petals, scarcely ever on the lower side. The origin of the essence is easily recognized as being the same as in the preceding case. The delicacy and the special odor of the essence furnished by each variety of roses seems to depend upon the more or less complete transformation of the intermediate tannoid compounds derived from the chlorophyll.

*Violets.*—The essence is here similarly situated. It is necessary, however, before applying reagents to the sections in this instance to immerse them in tungstate of sodium solution for some minutes, in order to precipitate the tannin. The essential oil then appears bright red.

*Tuberose.*—In this case, the essential oil is found upon the lower surface of different parts of the perianth. The intermediate cells contain a fixed oil. Tannin is scarcely perceptible. Here, then, in consequence of the abundance of chlorophyll in the first place, of the almost complete absence of tannin, and also, probably, of the presence of fixed oil which has swept it towards the periphery, the essential oil is carried towards the lower surface. The intense odor of the tuberose only commences to reveal itself when the oil is enabled to form itself into small drops under the influence of the reagent.

*Orange.*—The reagent discloses the presence of several distinct essences in orange blossoms. First there is that of the secretory sacs, which occur on the lower surface of the petals or sepals. This is not essence of neroli, as is generally supposed, but an essence analogous to that of petit-grain. By skilfully eliminating these sacs in an unopened bud, the agreeable odor of the flower when it afterwards expands is in no degree injured. Essential oil is still found in the epidermis on both surfaces of the petals, and likewise upon the periphery of the petaloid filaments of the stamens. By systematically preventing, in various ways, the liberation of the

<sup>1</sup> Blondel, "Produits odorants des Rosiers" ("Thèse de la Faculté de Méd.," 1889.)

perfume in these different regions, I have been able to assure myself that the odor from the upper surface of the petals alone corresponds to the finest neroli. The odor of the flower then is a mixture.

The conclusions to be drawn from these researches are :

(1) That the essential oil is generally found localized in the epidermal cells of the upper surface of the petals or sepals, though it may exist upon both surfaces, especially if the floral organs are completely hidden in the bud. The lower surface generally contains tannin or pigments derived from it.

(2) The chlorophyll seems, in every case, to give rise to the essential oil. This transformation is readily comprehended if it be admitted, as is generally understood, that the floral organs are but modified leaves found performing a new function. The chlorophyll being thus diverted from its original purpose, may be transformed into tannoid compounds or into essential oils.

(3) The liberation of perfume in the flower only becomes perceptible when the essential oil is sufficiently freed from the intermediate compounds which have given rise to it. Its formation is to some extent in inverse proportion to that of the tannin and pigments in the flower. This will explain why flowers with green petals possess no odor, why white flowers or roses are most frequently odoriferous, why the *Compositæ* which are so rich in tannin<sup>1</sup> have a characteristic disagreeable odor, and why the cultivated white lilac and forced roses acquire a very fine perfume.

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## THE ACTION OF NITRIC ACID ON METALS.<sup>2</sup>

By C. MONTEMARTINI.

Much contradiction exists as to the changes which occur when nitric acid acts on *tin*. The author finds<sup>a</sup> that the acid, up to a concentration of 12 per cent., always attacks tin with formation of stannous salt, which partially decomposes, forming a turbid solution; gas is always evolved, although slowly. Nitric acid from 12 to 45 per cent. completely dissolves the metal to a yellow solution, with an abundant evolution of gas; the solution, when left, slowly becomes turbid, but the precipitation may be retarded by

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<sup>1</sup> Daniel, "Le Tannin des Composées" (*Rev. Gén. de Bot.*, ii. 391).

<sup>2</sup> *Gazzetta*, 22, 384, 397 and 426; *Jour. Chem. Soc.*, 1892, p. 1402; compare also *Amer. Jour. Phar.*, Dec., 1892, p. 618.



adding hydrochloric acid. The tin is present in these solutions as stannous nitrate, and the turbidity is due partly to the oxidation of this salt and partly to its conversion into insoluble stannous compounds, which, in turn, yield stannic hydrate. Nitric acid of more than 45 per cent. concentration does not dissolve tin, but converts it into a white substance. If 70 per cent. acid is used, this white oxidation product is soluble in water, but the solution, after a few seconds becomes turbid, and stannic hydrate is deposited; the addition of hydrochloric acid to the clear solution greatly retards the precipitation. The soluble, white substance is found by analysis to be stannic nitrate,  $\text{Sn}(\text{NO}_3)_4$ ; it is stable in presence of concentrated nitric acid at  $90^\circ$ , but is immediately decomposed at  $100^\circ$ .

The solution of 1 gram of tin in excess of 27.5 per cent. acid yields 0.0180 gram of ammonia, 0.1060 gram of nitrous oxide, and 0.0051 gram of nitrogen. The maximum quantity of ammonia is obtained when 1 per cent. nitric acid is used, but the rate of diminution in the amount of this gas produced, as stronger acid is used, is small; even 70 per cent. acid causes the formation of much ammonia. The hypothesis that the nitric acid is reduced by nascent hydrogen is insufficient for the explanation of the phenomena observed during the action of nitric acid on tin.

Contrary to the statements of Personne (*Bull. Soc. Chim.*, 1864, i, 163) and Maumené (*Ann. Chim. Phys.* [4], **3**, 343), the action on *antimony* of nitric acid, varying in concentration from 2 to 70.27 per cent., does not yield appreciable quantities of ammonia; 2 per cent. acid has very little action on the metal. Antimony is not dissolved by nitric acid; a white powder always remains; when 70 per cent. acid is used, this residue seems to have the composition  $(\text{SbO})\text{NO}_3$ . Nitric peroxide is practically the sole gas produced when this metal is used.

*Molybdenum* is attacked by 3 to 70 per cent. acid without the formation of ammonia. Concentrated acid (70 per cent.) attacks the metal but slowly; a much more vigorous action occurs with weaker acid (50 per cent.) and a reddish solution and residue are obtained. The solution reduces permanganate, so that the metal is not immediately converted into molybdic anhydride by 50 per cent. acid, but a nitrate would seem to be first formed; 70 per cent. acid at once gives molybdic anhydride. The quantity of nitric oxide produced in the reaction between nitric acid and molybdenum decreases as

the concentration of the acid increases; nitric peroxide is the main gaseous product with 50 per cent. acid. Neither nitrogen nor nitrous oxide is formed.

No appreciable amount of ammonia is produced in the reaction between *copper* and 3 or 27.5 per cent nitric acid. Dilute acid (below 30 per cent.) yields only nitric oxide and nitrous acid; with stronger acid, the gas evolved is principally nitrogen tetroxide, but small quantities of the trioxide are also formed. With acid of less than 30 per cent. concentration, the reaction is represented by the equation  $\text{Cu} + 3\text{HNO}_3 = \text{Cu}(\text{NO}_3)_2 + \text{HNO}_2 + \text{H}_2\text{O}$ . Nitric oxide is then formed in accordance with the equation  $3\text{HNO}_2 = 2\text{NO} + \text{HNO}_3 + \text{H}_2\text{O}$ . Nitric peroxide only is obtained with 70 per cent. acid.

Below  $15^\circ$ , nitric acid of all concentrations attacks pure *lead* very slowly; rather dilute acid acts the most rapidly. Small quantities of ammonia are formed, the amount being greatest with weak acid.

The action of nitric acid (27.5 and 70 per cent.) on *bismuth* yields neither ammonia, nitrogen, nor nitrous oxide. More nitric oxide is obtained with dilute than with concentrated acid, and owes its origin to secondary action. 27.5 per cent. acid gives no nitric peroxide, but this gas is the main product if 70 per cent. acid be employed.

The reaction between nitric acid and *aluminium* proceeds very slowly; with 27.5 per cent. acid no ammonia was obtained.

*Mercury* yields no ammonia with 27 and 50 per cent. acid; the quantity of nitric oxide produced, diminishes as the concentration increases. 27.5 per cent. acid gives no nitric peroxide, but stronger acid yields large quantities just as in the cases of copper and bismuth. Mercurous nitrate is obtained in solution on operating with 25 per cent. acid; more concentrated acid (50–70 per cent.) gives the mercuric salt.

Nitric acid (27.5 per cent.) gives no ammonia with *silver*, but only nitric oxide and nitrous acid.

The amount of ammonia produced in the reaction between *magnesium* and nitric acid increases with the concentration of the latter until 40 per cent. acid is reached, the quantity then decreases. Much hydrogen is formed; the mixture of this gas and nitric oxide liberated by 13 per cent. acid may be exploded by an electric spark.

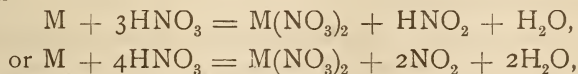
Ammonia is produced by the action of nitric acid on *manganese*; so much hydrogen is formed that the evolved gas will not explode

until oxygen has been added. Nitrogen and nitrous oxide are also liberated.

In all the previous experiments, excess of nitric acid was employed and the temperature was kept constant (15–20°).

The metals may be classed in three groups, according to their behavior towards nitric acid. To the first group belong those metals which, with nitric acid, yield only nitrous acid, nitric oxide, nitrogen trioxide, and nitric peroxide. Metals of the second group give, besides these products, hyponitrous acid, nitrous oxide, nitrogen and ammonia. In addition to these, metals of the third group liberate hydrogen. It is to be noted that metals belonging to the first group either do not decompose water at all or only at very high temperatures. Metals of the second group decompose water at much lower temperatures, and those of the third group act on water either at ordinary or at comparatively low temperatures. There is hence a relation between the products of the action of nitric acid on metals and the behavior of the metals towards water; this relation supports the author's view that water sometimes takes part in the reaction.

The author considers that the reaction between nitric acid and metals which do not decompose water may be represented by the equation



according as the acid used is dilute or concentrated. To explain the formation of nitrogen trioxide, the following equation is employed,  $2M + 6HNO_3 = 2M(NO_3)_2 + N_2O_3 + 3H_2O$ . When water plays a part in the reaction, a more complex series of equations is necessary.

## QUALITATIVE ANALYSIS OF COAL-TAR COLORING MATTERS.<sup>1</sup>

BY A. G. GREEN.

It is of importance to dealers in, as well as manufacturers of, these dyes that they should have the means to match colors, not only in respect to shade, but also in accordance with the chemical constitution of any unknown colors which may be submitted to

<sup>1</sup> Read before the Society of Chemical Industry; Abstract republished from *Chemist and Druggist*, January 14, 1893, p. 43.

them. The object of Mr. Green's paper was to submit a scheme of analysis formulated into tables, such as are used in qualitative inorganic analysis. Unfortunately, his MS. and proofs of the paper had miscarried, and he was compelled to give a *résumé* of the communication. Taking Weingärtner's scheme as the basis, Mr. Green showed that we may first divide the different colors according to their solubility or insolubility in water; then taking those which are soluble the addition of 10 per cent. aqueous solution of tannin determines whether the color is acid or basic, the latter affording a precipitate and the former none. Next, the behavior of the color with zinc dust, *plus* a sufficiency of hydrochloric acid or ammonia, furnishes another separation into three classes, viz., those which are readily, or slowly, or not at all, reduced. Again, taking those which are reduced, we may separate them into other three groups: (*a*) those which are completely reduced and cannot be reoxidized; (*b*) those which by means of chromic acid are brought back to their original state, or something like it; and (*c*) those which spontaneously reoxidize in the air. Azo colors may also be divided into those which do or do not dye cotton.

Water insoluble colors may be divided into those which are or are not soluble in caustic soda solution, and in regard to their behavior towards zinc dust.

Mr. Green then showed the meeting some of the reactions. Taking three blues—a thiocyanin, a roseaniline derivative, and an azo blue—he showed that all were reduced by zinc and hydrochloric acid, the thiocyanin color reoxidizing quickly, as was evident when some of the solution was placed on a piece of filtering paper; the roseaniline color was seen to be a faint yellow; and the azo color had a red shade. On moistening with chromic acid the roseaniline was still unchanged, but ammonia vapor brought back the blue, whereas with the same oxidizer the azo stain was changed to a secondary color not affected by ammonia. Similar experiments were shown with three red colors, and again distinctive reactions resulted.

It was next stated that sulphuric acid distinguishes between coloring matters chemically different, although belonging to the same group. That was shown by treating three scarlets (alike in shade when dissolved in water)—xylene dissolved red in the acid, crocein brown-black, and Biebrich's scarlet gave a deep blue.



In concluding, Mr. Green explained the theory of the zinc dust reaction. Taking all these colors as quinone compounds he thought that those which reoxidize readily are ortho-derivatives and those which reoxidize slowly are para-derivatives: magenta (roseaniline) belongs to the latter and phosphine (chrysaniline derivative) to the former.

The discussion consisted mainly of questions.

Dr. Alder Wright asked how far the scheme could be utilized for mixtures of colors. Mr. Bevan wanted to know how to proceed in applying the reactions to colored fabrics. Mr. Blount asked if it was the case that the majority of artificial blues are soluble in alcohol, even when on the fabric, and could this be used as a means of distinguishing between them and indigo.

The Chairman (Mr. W. Thorp) suggested that some indication should be given in the tables of what the chemical nature of the colors is, as the commercial names do not suffice for this.

Mr. Green, in replying, said that it was difficult to analyze mixtures of colors, and his tables did not pretend to do that, but it was often comparatively easy to tell whether a color was a mixture or not. If it be finely ground and a little sprinkled on a piece of wet filtering paper, then held up to the light, it would be seen that the margins of the particles differed in color if there were different dyes present. So also in regard to the behavior of the mixture when a little of it was sprinkled on sulphuric acid, or when the matter of ten swatches of cotton were dipped into the dye-bath under different conditions, or whether wool and cotton behaved differently. These and other methods could be utilized, but it was not possible, he thought, to deal more systematically with mixtures. Colors could be extracted from fabrics with alcohol or carbonate of soda, and the table tests then applied. All basic blue colors could be removed from fabrics by alcohol, but not the acid ones. It was impossible to use either formulæ or constitutional names in the tables, and on the whole the commercial names were most useful in this instance. In reply to Mr. Crowther, he stated that the spectroscope was sometimes useful in this connection, and a very simple way of ascertaining whether a dye was a mixture or not was to allow a little to soak up strips of filtering paper, when by capillarity such a thing as picric acid, for instance, would reveal itself even in a roseaniline solution.

NOTE ON THE INTERACTION OF IODINE AND POTASSIUM CHLORATE.<sup>1</sup>

BY T. E. THORPE, F.R.S., AND GEORGE H. PERRY, Assoc. Roy. Coll. Science.

The interaction of iodine and potassium chlorate, first employed by Berzelius for the preparation of iodine monochloride, is usually represented by the equation



We find, however, that when an intimate mixture of iodine and potassium chlorate, in the proportions demanded by the above equation, is heated, not only is the yield of iodine monochloride invariably very far below the theoretical amount, but that much of what actually is formed is converted into the solid trichloride, and that free chlorine and more or less iodic anhydride are often simultaneously formed. These facts seem to show that the actual change is very imperfectly indicated by the equation above given.

Careful quantitative experiments, so arranged that the various products of the change, both fixed and volatile, could be estimated, have shown that, in reality, the primary and main reaction between iodine and potassium chlorate is a simple metathesis:  $2\text{KClO}_3 + \text{I}_2 = 2\text{KIO}_3 + \text{Cl}_2$ . The chlorine so liberated attacks any iodine that is not within the "sphere of action" of the heated chlorate, and forms more or less mono- and tri-chloride of iodine, in amounts depending upon the temperature and mode of heating. When care is taken not to heat the mixture to a higher temperature than is actually necessary to effect the above change, the saline residue contains only traces of potassium chloride and perchlorate, which seems to indicate that these substances are not really products of the direct action, but are formed by local superheating of the chlorate, with evolution, of course, of oxygen, and consequent formation of iodine pentoxide. By careful management, it is possible to convert practically the whole of the iodine present into potassium iodate, with the liberation of the equivalent amount of gaseous chlorine.

Iodine monochloride, as is well known, is readily dissociated by heat into the trichloride and free iodine. It seemed to us interesting to determine whether a solution of iodine monochloride in chloroform or carbon tetrachloride would show any indication of such dissociation when allowed to diffuse into a quantity of the same

<sup>1</sup> *Journal of the Chemical Society*, 1892, p. 925.

solvent. The experiment indicated that no such dissociation occurred, but that the ratio of iodine to chlorine remained unchanged throughout the mass of the solution, a conclusion in harmony with the results of recent work by Stortenbeker reported in *Zeit. Physikal. Chem.*, **10**, 183.

## CHLOROFORM.

BY D. BROWN.

How many varieties of chloroform are required to supply the demands for preparations suitable for anæsthetic and manufacturing purposes?

This is a question which should be asked, and, after careful consideration, answered by all interested in the subject.

It is the general opinion that for manufacturing purposes a fairly pure preparation only is required, and there is an equally unanimous opinion that for anæsthetic purposes a product of the highest degree of purity should alone be employed. There is, however, some difference of opinion among medical men and pharmacists regarding the source from which the latter product should be obtained; some believing that it can be and is produced from pure, as well as from impure, raw materials, while others contend that it can only be produced in a state of purity from pure materials, such as pure spirits of wine or chloral hydrate crystals.

In order to ascertain which of the opinions is the correct one, it will be necessary to state a few facts regarding products obtained from pure and impure materials.

Pure products are obtained from tar, urine and putrid flesh, as well as from many other impure substances. Alkaloids in a state of purity are also extracted from numerous impurities; in some cases from as much as 95 per cent. of extraneous matter, and it is well known that chloroforms in an equal state of purity are produced from pure as well as from impure raw materials. In evidence of this, we know that all attempts which have hitherto been made to determine the origin of pure chloroform have proved failures; and published analyses speak to the purity of alkaloids which have been separated from larger quantities of impurity than chloroform is ever found associated with.

It is evident, therefore, that the quality of the finished products depends not on the character of the raw materials, but on the

thoroughness of the purification to which the crude products have been subjected.

If the character of the finished product is determined by the materials used we should find the products from chloral hydrate and spirits of wine standing alone at the top of the list as the purest of all preparations. Experience shows that they do not occupy this position; products from other and less pure materials being in many cases found to excel them in purity, and in others to be on an equal footing with them. A sample of chloral hydrate chloroform which I lately examined was found to be the most impure of a series representing all the different brands, and the crude product from chloral hydrate to be more impure and more difficult to purify than similar products from impure raw materials; in fact, the production of chloroform from it is, I believe, being abandoned, because of the difficulty experienced in its purification.

So long as it remains impossible to determine the source from which pure chloroform has been obtained, and chloroform prepared from the purest materials is found to contain more impurity than others from impure sources, the advocates of the pure raw material product *as the only pure one* cannot reasonably expect confidence to be placed in their statement, when pure products are known to be obtained from either source; and their position is still further weakened by the fact that they are unable to tell one pure chloroform from another without consulting the label, and even then they may be wrong, if the samples have not been correctly marked.

At present there are chloroforms prepared from at least five different sources, but I have no hesitation in saying that two different brands—which may or may not be prepared from the same material—are all we require; one of the highest degree of purity for anæsthetic purposes, and a second, not so highly purified, for the use of manufacturers.

If what has been said regarding the effects of purification is true—and I think there can be no doubt about it—it is evident that purification is the only factor which determines the quality of all chloroform, and that it has been and is successfully used to level up to a state of equal purity crude products of all kinds.

The purest chloroform therefore must be that which—irrespective of origin—contains the smallest quantity of impurity.—Phar. Jour. and Trans., Decb. 24, 1892, p. 505.



## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, January 17, 1893.

Wm. B. Webb, Ph.M., was called to the chair, and on motion of Professor Trimble the reading of the minutes of the last meeting was dispensed with.

Professor Remington spoke of the use of sixty per cent. acetic acid in exhausting drugs of their active principles, and exhibited a number of specimens of the fluid preparations thus made, and also the drugs that had been subjected to this treatment. The use of this acid is becoming more important, as it affords a most reliable and economical escape from the exorbitant and increasing tax to which druggists and pharmacists have been subjected through the internal revenue tax on alcohol, and through the recent action of the Whiskey Trust in forcing up the price of whiskey and consequently that of alcohol. The acid may be used for solid as well as for fluid extracts; equal weights of this sixty per cent. acid and water make an acid of the same strength as the No. 8 acetic acid of commerce. It was inquired whether the liquid preparations of the aromatics, and of similar drugs, when mixed with water were clear; this was shown to be the fact.

Messrs. J. Ellwood Lee & Co. exhibited samples of the *aseptic gauzes*, and their improved method of keeping them in that condition; these gauzes are packed in cartons, sterilized by means of a thorough immersion in paraffin; the ligatures, made of sterilized silks, are put on spools and then packed in glass tubes surrounded with alcohol; in withdrawing them through pierced rubber stoppers they are completely dried and ready for use.

Professor Trimble presented, on behalf of Parke, Davis & Co., to the museum a handsome collection of soft capsules. Professor Remington explained the method of making them over bone moulds, great care being necessary in having the proportion of gelatin, glycerin and water just right to produce a film which shall be sufficiently elastic to slip off the mould; the filling is done by means of a burette and pinch-cock.

The following paper was then read by the author:

*Some Curious Experiences of a Month in a Drug Store* may be said to confirm the wisdom of the college in maintaining the pharmaceutical meetings. It is an admitted fact that all advance workers in professional and mechanical sciences do find no method so prolific of good as the face to face meet and interchange of thought. We are all asked questions upon subjects which are new to us and have not the time, and sometimes not the ability, to investigate or answer. To all such this is a good place to have such problems solved. While it is advisable to read the numerous journals claiming to be exponents of progress and exact knowledge in matters pharmaceutic, it is more than necessary that the busy pharmacist, who finds his time engaged in multitudinous ways of maintaining not only his professional but his mercantile standing, should be able to discriminate when the subject matter is not altogether free from a business bias.

Our neighbors, the grocers, realizing the advantage, hold annually an Exposition, with paid admissions and liberal expenditure of money for demonstrators in the culinary art.

Many of the experiences may not be new, yet not devoid of some interest,

and are recited with the hope of encouraging other members to contribute to the interest of these meetings.

*Niccoli bromidum* is seldom written, and requires a second look to recognize bromide of nickel.

A box of "*Ace of Spades*" is the name of a shoe polish; but *Flake White* seems innocence itself, and any caution is resisted when statement is made—"it is carbonate of lead and a poison."

By an accident to a boy the crown of a tooth was broken and a splinter of oak wood forced through the body and root of the tooth. Extraction revealed the nature of the injury.

*Glass splinters* in bottles are of rather frequent occurrence and should be removed at the time the bottles are washed.

When *aniseed* is sold down to bottom of the drawer, the remainder will usually be heavily laden with small fragments of rock and earth.

It is well to remember that *syrup of cubebs* is used as a diluent, and should not be made by mixing fluid extract and syrup.

Some *extract of belladonna* and water when rubbed with an iron spatula gave to the latter a copper coating.

A trade package, labelled ground *belladonna root*, was found to be belladonna leaves.

Information is wanted as to the composition of a red powder called *coaline*; it is sold as an improver of poor coal and to hasten a dull fire.

WILLIAM MCINTYRE.

Mr. Moerk read a paper upon the rapid *assay of hydrogen peroxide*, and showed the process to be a practical one.

Professor Remington showed the method of *preparing hydrogen peroxide* extemporaneously by the use of barium dioxide and syrupy phosphoric acid, the barium dioxide is to be dissolved and the diluted acid is then added gradually with certain precautions; the resultant liquid contains some barium in solution, which is separated by diluted sulphuric acid.

A vote of thanks was passed to the gentlemen having contributed subjects of interest, and the meeting then adjourned.

T. S. WIEGAND, Registrar.

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## EDITORIAL.

*The Eleventh International Congress of Medicine* will convene in the city of Rome, Italy, September 24, 1893. The provisional committee announces that, in consonance with Articles III and XVII of the General Regulations, pharmacists may be inscribed as members of this Congress, and that a special Section on Pharmacology will be organized by a committee composed of distinguished professors of that branch of science.

*The State Pharmaceutical Examining Board of Pennsylvania* held an examination in the Central High School at Philadelphia, on Monday, January 16, the candidates numbering 262, namely, 118 for registered pharmacists certificates and 144 for qualified assistants certificates. Forty-four of the former and 90 of the latter class were successful.

At the preceding examinations, held in October in Philadelphia and Pitts-

burg, 36 (out of 129 applicants) were granted registered pharmacists certificates, and 41 (out of 122 applicants) certificates as qualified assistants.

*Amendment to the Pennsylvania Pharmacy Law.*—On p. 331 of our last volume we recorded the action taken by the Medical Society of the State of Pennsylvania in favor of requiring physicians, who intend to carry on the retail drug business, to pass an examination under the pharmacy law. Governor Pattison, in his message to the legislature, referred to the same matter in a direct and judicious manner, using the following language :

“The act of 1887, regulating the practice of pharmacy, would be rendered more effective by amendment. Section 11 of this act provides that ‘Any graduate of any accredited medical college, who has had not less than three years continued practice since the date of his diploma, and who is registered as a practitioner of medicine and surgery, may be registered under the pharmacy act without examination, and be granted a certificate to all the privileges under the provision of the law.’ The special training required by the pharmacist can only be had after a term of apprenticeship or a college course, and even after that, he is required to pass an examination. His college certificate does not carry with it the same force and effect as the diploma and experience of the physician. It is recommended that Section 11, of the act of 1887, be repealed, so as to place the demands of registration for all applicants under the pharmacy act on the same footing.”

We understand that a bill has been introduced repealing the obnoxious section in conformity with the recommendations of the State Medical Society and of the Governor, and in accordance with the unanimous sentiment of the pharmaceutical profession ; and it is to be hoped that none of the legislators may be blind enough not to see the justice of the proposed measure.

*The California College of Pharmacy* held its nineteenth annual commencement in Odd Fellows Hall, San Francisco, November 10, last, when the diploma of the College was conferred upon 33 candidates, including one lady ; and certificates of proficiency were awarded to two ladies and two gentlemen.

*The excessive price of alcohol* in the United States has been ventilated in a circular recently issued by the Philadelphia Drug Exchange. Commencing with July 1, 1862, the excise tax on proof spirit was 20 cents per gallon ; March 7, 1864, it was made 60 cents ; June 30, 1864, \$1.50 ; December 22, 1864, \$2 ; July 20, 1868, 50 cents ; June 6, 1872, 70 cents, and since March 3, 1875, it is 90 cents per gallon. No reason whatever can be assigned for such a vacillating course. The present tax amounts to \$1.692 on a wine gallon of 94 per cent. alcohol ; but the customs duty on spirit is \$2.50 per *proof* gallon, which is equal to \$4.70 per *wine* gallon of 94 per cent. alcohol. It is obvious that this duty is simply prohibitory, and it is no wonder that a “trust” has been formed, virtually monopolizing the trade in distilled spirits, and exacting for these goods any price they choose to exact.

The circular also shows that in May, 1892, alcohol was obtainable at \$1.98, net, per gallon. Since the Whiskey Trust was formed, the price has been continually rising, and January 10, last, it was, in 10 barrel lots, \$2.64. Under certain restrictions the trust allows a rebate of 7 cents per proof gallon. Deducting the government tax from the price in May last we have  $1.98 - 1.692 = 28 + \text{cents}$  per gallon ; while after deducting the government tax and the

trust's rebate (7 cents per *proof* gallon = 13.16 cents per *wine* gallon of 94 per cent. alcohol) we have in the beginning of January 2'64 — (1.692 + .1316) = 81 + cents as the trust price for alcohol; or in other words, under the management of the trust the price of alcohol—exclusive of the government tax—has been almost trebled. And since there is still a margin of over \$2 per gallon as compared with the customs duty on imported 94 per cent. alcohol, it is possible that the limit in rise has not yet been reached.

The circular alluded to also calls attention to Great Britain, where the excise duty on home-made spirit is 10s. pr. proof gallon, and the customs duty on imported spirit 10s. 4d. per proof gallon, a difference of 4d., or 8 cents, merely sufficient to compensate for the inconvenience inflicted on home producers.

Moreover, manufacturers in the United Kingdom have the advantage of using methylated spirit (a mixture of alcohol and methylalcohol), free of tax; and in other countries analogous facilities have been afforded, those now adopted in Germany being explained in the following, copied from the *Pharm. Jour. and Trans.*, of January 14, 1893:

"Arrangements have been made in Germany for permitting the use of spirit free of duty for medicinal, pharmaceutical and manufacturing purposes, and the regulations under which this is to be allowable have now been published. The manufacture and supply of duty free spirit will be regulated so as to prevent misuse and keep a control upon its application. Those who desire to avail themselves of the privilege must apply for permission and make a statement as to the purpose for which the spirit will be used, with an estimate of their probable consumption. Users of duty free spirit will have to keep for inspection an account of the quantity used and the purpose for which it is used, and their premises will be examined from time to time. Liquors and all preparations, such as concentrated essence of ginger, cannot be made with duty free spirit in any case; but it is intended to offer facilities for its use in all cases where there is no reason to apprehend interference with the revenue derived from alcoholic preparations which are capable of being used as beverages."

In view of the contrasts shown above, there is evidently much room on this side of the Atlantic for lessening the burden placed upon a necessity for industrial pursuits, and for the prevention of monopolistic practices.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*Yearbook of Pharmacy*, comprising Abstracts of Papers relating to Pharmacy, Materia Medica and Chemistry, contributed to British and foreign journals from July 1, 1891, to June 30, 1892. With the transactions of the British Pharmaceutical Conference at the twenty-ninth annual meeting held at Edinburgh, August, 1892. London: J. & A. Churchill. Pp. 560.

The prompt publication of this volume about four months after the meeting is very commendable. On pp. 535 to 546 of our last volume we have given an account of the transactions at the meeting. The yearbook, which is analogous to the "Report on the Progress of Pharmacy" annually published in this country, occupies 252 pages, to which about 20 pages are added, containing lists of books bearing on pharmacy, published during the year.



*Charaka-Samhita*, translated into English. Published by Abinash Chandra Kaviratna, practitioner of the Hindu System of Medicine, etc., Calcutta.

When noticing the publication of the first fascicle on p. 286 of our last volume, a history of this ancient work was given as far as known, and its importance for the study of medicine in general, and of materia medica in particular, was pointed out. Three fascicles of the English translation are now before us, containing seven lessons which treat of longevity; of drugs and gruels useful in curing diverse diseases; of powdered drugs and plasters; of purgatives and astringents; of proper diet; of food in different seasons, and of the inadvisability of suppressing the urgings of nature. The explanatory annotations, added by the translator, will be especially appreciated by the reader. In this form the work is unquestionably a most valuable addition to the history of medicine in earlier times, made accessible to those who are not conversant with the ancient languages of Eastern countries.

*A System of Instruction in Qualitative Chemical Analysis.* By Arthur H. Elliott, Ph.D., Professor of Chemistry and Physics, and Director of the chemical laboratory in the College of Pharmacy of the City of New York. Published by the author. 1892. 8vo. Pp. 120.

A very useful and practical work, intended, as stated by the author in the preface, to be used with the living teacher. It treats of reagents and apparatus; of the separation of metals into groups; of the special tests for each metal; of the separation and detection of acids and their special tests; of the preparation of solutions, and finally of several special methods. The effects of reagents are fully described, and many details of manipulation are given and explained which will be appreciated by the students. The different paragraphs are numbered consecutively and conspicuously with the view of facilitating cross references.

*Carl Wilhelm Scheele.* Nachgelassene Briefe und Aufzeichnungen herausgegeben von A. E. Nordenskiöld. Stockholm: P. A. Norsted & Söner. 1892. Large 8vo. Pp. xliii and 491.

A publication of great historical interest and importance is presented in this volume. The editor, after obtaining some relief from the scientific labors incidental to his voyages in the polar regions, again took up his researches, first begun about thirty years ago, into the history of Scheele's life, and finally succeeded in having copies made of the various original letters, laboratory notes and other papers preserved in the State's archives of Sweden. From the photographic reproductions of one of the letters and of several pages of laboratory notes, it is easily seen that for understanding the former the chief difficulty lies in correctly interpreting the Latin chemical terms and signs used by Scheele. The latter were more largely used by him in his laboratory notes, which are evidently brief memoranda made at the time the experiments were executed. The Latin terms are explained in a table occupying twelve columns, while in another table of four columns the most important signs are translated. The total number of the documents, aside from the laboratory notes, is 135, comprising notes made by Gahn on many experiments made by Scheele, and letters written by the latter to Retzius, Gahn, Bergius, Bergman, Hjelm, Hising and Lavoisier. These documents were mostly written in German, but some were in Swedish and one or two in French.<sup>1</sup> They are published in full, with

but few omissions of unimportant matters having no reference to chemistry, the signs being replaced by the Latin chemical terms used by Scheele. As an introduction to each document its contents are briefly indicated, and the text is in nearly each case followed by brief explanatory notes, frequently of a historical character. The letters are preceded by a biography of Scheele, occupying 28 printed pages, and by a list of the titles of his published essays.

It is impossible to enter in this place into details; but it may be stated that the documentary evidence here produced shows not only the wide extent of his experimental researches, but likewise his clear views and deductions; and it appears that he is doubtless entitled to the honor of being the first discoverer of chemical bodies, other than those that have heretofore been credited to him. Thus it is shown, that during the years 1771 and 1772 Scheele had isolated *oxygen*, which he at first called "*aer vitriolicus*," from mercuric carbonate, mercuric oxide, silver carbonate, magnesium nitrate and from a mixture of black manganese and arsenic acid. These researches, which included also the chief properties of the gas, preceded Priestley's discovery (August 1, 1774), from two to three years; but they do not in the least detract from the honor due to Priestley for his independent discovery, nor do they lessen the immense value of Lavoisier's researches, upon which the structure of modern chemical science has been erected.

The work has been published both in the Swedish and German languages, the latter version having been prepared by Paul Berndt and revised by Prof. E. von Meyer.

*Traité général d'Analyse des Beurres*, préparation, caractères, composition, altérations et falsifications; méthode générale d'analyse, discussion et appréciation des résultats. Par A. J. Zune, rédacteur en chef du *Moniteur du Praticien*. Chez l'auteur, 108 bis, rue de Rennes, Paris; et chez l'imprimeur-éditeur, A. Allard, Braine-l'Alleud, Belgique. Complet en deux volumes; prix, 25 francs.

A general treatise on the analysis of butters. Vol. I. Pp. 490, with 83 illustrations and 63 tables inserted in the text. Vol. II. Pp. 340, with 270 illustrations and 85 tables inserted in the text, and with 14 plates.

These two volumes constitute a very comprehensive and meritorious monograph on butter, its substitutes and adulterations, and their recognition and determination. The first volume is devoted to general considerations which are discussed in ten chapters, beginning with the preparation and conservation of butter and of the numerous artificial compounds used in place of the natural product. In the next four chapters the characteristics of these articles are considered, as organoleptic characters (appearance, consistence, color, odor and taste); physical characters (fusing and solidifying points, density, solubility, etc.); optical characters (crystallization, polarization, etc.), and behavior with various reagents, such as sulphuric acid, nitric acid, silver nitrate, gold chloride, etc. The two following chapters treat of the proximate composition as determined by different authors, viz: fat, water, casein, salt, palmitin, olein, butyrin, etc.; and the subsequent chapter gives an account of the products—the various acids and glycerin—obtained by saponification; while the concluding chapters discuss the processes recommended by various others for the detection of falsifications, and the alterations which occur in butter and other

fats through the influence of air, light and heat, and the changes due to diseases of the cows as well as through faulty processes of manipulation.

The second volume treats of the methods of examination, beginning with the determination of the physical characters of butter and its substitutes, which is followed by the proximate analysis (estimation of matter volatile at 100–110° C., and on ignition; soluble in ether; soluble and insoluble in water; coloring matters), the qualitative and quantitative analysis of the fat, and the microscopic analysis. These chapters are intended to give full descriptions of the complete analysis of natural and artificial butters, and of the impurities which in both kinds of products have been observed to be sometimes present either by design or accidentally. Among these impurities described and figured by the author are not only various salts, coloring matters and starches, but also different bacteria, moulds, vegetable fragments, human and animal hairs and a few animal parasites, which evidently can find their way into such products only through want of cleanliness in preparation and preservation. For practical purposes such a full analysis is not required, but it is of importance to ascertain the character of the product, whether natural or artificial, and whether or not injurious to health. These points are formulated by the author in eight questions, which are then briefly discussed with reference to the results obtained by the analytical methods described in other chapters. A supplementary chapter discusses the results of observations made, and certain analytical methods proposed, while the work was passing through the press.

It will be seen from the above that the field covered by this work is quite an extensive one; and on examination it will be found that nothing of importance pertaining to this matter has been omitted. The descriptions of apparatus, processes and methods are full, and even minute, and though in some cases more prolix than would seem to be necessary, the details are not tedious, and in all cases will be useful in obtaining uniformity of results. The numerous illustrations referred to above give fair representations of the objects; the tables inserted in the book are practical and useful; and types, paper and the general make-up of the work are commendable. It should be mentioned yet that at the close of the different chapters copious references are made to authors and their publications on the subjects discussed.

*Proceedings of State Pharmaceutical Associations.*

The following have been received during last month:

*New Hampshire.*—Nineteenth annual meeting held at Keene, Septbr. 6 and 7, 1892. Pp. 90.

For a brief account of the transactions, see p. 545 of the October number. On Septbr. 5 next, the association will meet at Isles of Shoals; Frank L. Way, Manchester, Secretary.

*North Carolina.*—Thirteenth annual meeting held at Raleigh, August 10 and 11, 1892. Pp. 91.

In addition to the essays mentioned on p. 500 of our September number, papers on the following subjects were presented at this meeting: Compound syrup of hypophosphites; apparatus for dispensing lime water; wine of beef and iron. The next meeting will convene at Winston, August 9 next; F. W. Hancock, Oxford, secretary; F. A. Bobbitt, Winston, local secretary.



*Minnesota*.—The next meeting will be held June 13 and 14 next at Lake Minnetonka, one of the most attractive summer resorts in the northwest.

*Wisconsin*.—On p. 52, January number, line 18 from top, for Minnesota read Wisconsin.

*Address delivered by President H. M. Whitney* at a meeting of the Massachusetts State Pharmaceutical Association held in Springfield, Mass., September 6, 7 and 8, 1892. 8vo. Pp. 21.

A very interesting and forcibly written address, reviewing the work done by the Association and making some very pertinent recommendations.

*A Text-book of Practical Therapeutics*, with especial reference to the application of remedial measures to disease and their employment upon a rational basis. By Hobart Amory Hare, M.D., B.Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia, etc. Philadelphia: Lea Brothers & Co. 1892. 8vo. Pp. 696. Price, cloth, \$3.75; leather, \$4.75.

A text-book which necessitates the publication of three editions in two years, has evidently been found to possess qualities which render it especially useful and instructive to those for whose use it has been intended. The plan and scope of the work has been explained before upon the appearance of the two previous editions, and we have also pointed out the care bestowed upon the text so as to render its statements full and reliable. That in this new edition the same attention to all the details has been given, more particularly to the physiological action, the therapeutic uses and the modes of administration, becomes at once evident upon comparing the text with that of the previous issues, not merely by the addition of new matter or recent observations, but likewise by, sometimes slight, changes calculated to render it still clearer or more precise. Among the new compounds introduced we find dermatol, diuretin, euophen, guaiacol, pental, piperazine, strontium salts, terpinol and thiol. That a few erroneous or vague statements relating to the origin of some drugs have crept in, has been noticed on a former occasion; this does not interfere with the primary object of the book to provide the physician or under-graduate of medicine with a reliable guide in the study of therapeutics, or the application of remedial measures for the cure of disease.

*Contributions from the U. S. National Herbarium*. Vol. I, No. vi. Published by authority of the Secretary of Agriculture.

This pamphlet contains a list of plants collected by C. S. Sheldon and M. A. Carleton in the Indian Territory in 1891, reported by J. M. Holzinger; and a report by M. A. Carleton, assistant botanist of the Kansas Agricultural Experiment Station, on the native plants of Oklahoma and adjacent districts.

*Contributions from the Botanical Laboratory of the University of Pennsylvania*. 8vo. Pp. 72, and 13 plates.

The first number of this serial contains papers on *Rudbeckia hirta* and on *Brunella vulgaris*, by Professor Rothrock; *Dionæa Muscipula*, by J. M. Macfarlane, and by J. W. Harshberger; *Epigæa repens* and on the movements of leaves, by W. P. Wilson; and on Mangrove Tannin, by Professor H. Trimble.

*An Operation for the radical Cure of Stricture of the Lachrymal Duct*, with description of a stricturotome. By Charles Hermon Thomas, M.D., Philadelphia.

Reprint from the Ophthalmic Review, vol. xi.



*Report of the Surgeon-General of the Army to the Secretary of War*, for the fiscal year ending June 30, 1892. Washington: Government Printing Office. 8vo. Pp. 126 and 13 plates.

The report gives a full account of the work done under the direction of the Surgeon-General and of the health of the military departments and of the various posts. Of particular interest to pharmacists are those portions of the report relating to hospital stewards and to the hospital corps, the latter organized for the twofold purpose of always having on hand, for any emergency, a trained body of sanitary soldiers, and of building up a training school through which, ultimately, all enlisted men of the hospital corps will pass. The plates are illustrations of field equipment, such as ambulance, emergency case, medicine chest, food chest, field furniture, equipment of the hospital corps, etc.

*A Study of the Comparative Actions of Antipyrine, Phenacetin and Phenocoll* on the circulation and heat phenomena. By David Cerna, M.D., Ph.D., etc., and William S. Carter, M.D., etc.

The essay is the result of researches made in the physiological laboratory of the University of Pennsylvania.

*Ueber Salophen und dessen therapeutische Verwendung.* Von Dr. Josef Frölich. 8vo. Pp. 18.

On salophen and its therapeutic uses. Reprint from "Wiener Medizinische Wochenschrift." The author, who made his observations in the Vienna General Hospital, considers salophen preferable in acute rheumatic arthritis to sodium salicylate and to salol, owing to its tastelessness, and because its use may be prolonged without producing unpleasant effects.

*Trional als Hypnoticum.* Von Dr. A. Boettiger. Pp. 13.

Trional as a hypnotic. Reprint from "Berliner klinische Wochenschrift." The observations were made in Prof. Hitzig's clinic at Halle.

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## OBITUARY.

*Professor Jean Léon Soubeiran* died at Montpellier, France, December 15, 1892, at the age of 65 years. He was born in Paris, November 27, 1827, and received his scientific training at the Pharmacy School in the same city, where his father Eugène Soubeiran was professor of pharmacy. The deceased graduated from this school in 1853 and 1854, the subjects of his theses on these occasions being "micrographic studies on some starches," and "on the application of botany in pharmacy." He devoted much attention to botany, zoölogy and geology, and to natural sciences in general, but particularly to materia medica. In former years, he wrote valuable essays on cinchona bark, rhubarb, mastic, catechu, isinglass, cod liver oil, etc., and was the author of a creditable work on falsifications and alterations of alimentary and medicinal substances and other products. In 1873, he was called to the chair of pharmacy in the école supérieure connected with the Montpellier University, which position he held at the time of his death. He was also for many years a member of the committee entrusted with the publication of the Journal de Pharmacie et de Chimie. The scientific labors of the deceased were valued at home and abroad, and he was elected correspondent or honorary member by

many societies; among others he was an honorary member of the Philadelphia College of Pharmacy and of the American Pharmaceutical Association.

Notice of the death of the following graduates of the Philadelphia College of Pharmacy has been received:

*Elmer Lindsay Cameron*, Class 1892, died of consumption, December 22, at his home at Chambersburg, Pa.

*James M. Cunningham*, Class 1864, died suddenly at the drug store under the Continental Hotel, January 4th, aged 48 years. After graduation he was in business at Pottstown, Pa., and was a member of the legislature of Pennsylvania for Montgomery County during the years 1885 and 1887. Recently he was manager of the store in Philadelphia where he died.

*Parker P. Ink*, class 1871, died at West Orlando, Fla., November 2, 1892, at the age of forty-five years. He served his apprenticeship at Frederickton, O., and after graduating commenced business at Washington, Ia., acting also for some time as salesman for some western firms. His health failing, he sold his store and moved to Florida about four years ago and engaged in the cultivation of the grape. The mild climate proved beneficial to his health, until a few weeks before his death, he was taken seriously ill with pulmonary consumption. His body was taken to Washington, Ia., for interment.

*James P. Milner*, class 1865, died October 25 last at his residence, 523 Pine Street, Philadelphia, aged 48 years. After graduating in pharmacy he studied medicine, and at the time of his death conducted the drug business at Sixth and Lombard Streets, in connection with his medical practice.

*Edwin Myers*, class 1877, died Novbr. 11, last, at his residence, 2856 Germantown Avenue, Philadelphia, at the age of 44 years. He was formerly in business for himself in this city.

*Francis Henry Poley*, class 1876, died Septbr. 16, 1892, at the age of 38 years, in Norristown, where he was engaged in the drug business.

*John W. Simes*, class 1836, died December 29, last, aged 77 years. His inaugural essay on *Solanum Dulcamara* was published in this journal, April, 1836. The deceased had carried on the drug business for many years at 22d and Market Streets, Philadelphia, and was the last of three well-known brothers, who formerly were engaged in the drug business in different parts of the same city.

*John Wendell*, class 1860, died suddenly of heart disease, January 6, aged 54 years. He was formerly in business at Fourth and Brown Streets, Philadelphia, but retired from active business several years ago.

*George W. Wolfersberger*, class 1887, died Octbr. 21, 1892, while studying medicine at the Jefferson Medical College, in his twenty-eighth year. He was a native of Campbellstown, Pa., and had been in business for himself for a few years at 6th and Vine Streets, Philadelphia.

## VARIETIES.

*Poisoning by Sulphonal*.—Dr. J. B. Marvin reported to the Medico-Chirurgical Society of Louisville the case of a man who had taken on his own prescription, 240 grains of sulphonal in five doses during two days, and died on the evening of the following day.—*Med. and Surg. Rep.*, July 9, 1892, p. 66. See also *Amer. Jour. Phar.*, 1891, p. 424.





THE NEW COLLEGE BUILDING.



# THE AMERICAN JOURNAL OF PHARMACY.

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MARCH, 1893.

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## THE NEW BUILDING OF THE PHILADELPHIA COL- LEGE OF PHARMACY, WITH A BRIEF HISTORY OF THE OLDER BUILDINGS.

An Address delivered by JOSEPH P. REMINGTON, at the Opening Ceremonies,  
February 22, 1893.

When an American institution has passed the age of activity allotted to man, the three-score years and ten of olden time, and still is full of strength and life; when this institution has proved the wisdom and sagacity of its founders, by exhibiting in its career of seventy-two years a steady growth; and when it can be said that those who have been sent forth under its seal of approval are among the brightest in the profession, it may truly be asserted that it has firmly established its right to exist; and, surely, no impropriety can be attributed to it if, on an occasion like this, a pause is made and sufficient time is taken to make a brief retrospect of what has been accomplished by this organization, which is so well known throughout the world as the Philadelphia College of Pharmacy.

It is especially appropriate that upon this day, on the anniversary of the birth of the Father of our Country, and in this year, which marks the four hundredth in the history of America, we should meet to celebrate the completion of this building, the present home of the first institution founded in the New World for the dissemination of pharmaceutical knowledge. There is also a historical significance in the fact, that this is the seventy-second anniversary of the initial meeting of the body, which ultimately became the Philadelphia College of Pharmacy.

The Philadelphia College of Apothecaries was instituted February 23, 1821, at a general meeting of the apothecaries and druggists of the city and districts. At this meeting it was proposed "that the whole profession should form themselves into a society, for the two-fold purpose of providing a system of instruction in pharmacy, and subjecting themselves to regulation in their business." "This proposition was adopted and a committee was appointed to draft a corresponding project."

"The committee at a subsequent meeting reported the plan of the present College of Pharmacy, which was unanimously agreed upon."

"The College on the adoption of this plan immediately became organized by the election of officers and a board of trustees, who in the same autumn established the School of Pharmacy and appointed lecturers in time to commence the course the ensuing winter."

"At this time (1826), the College included nearly the whole of the druggists and apothecaries of the City and Liberties, who have thus voluntarily placed themselves under a system of regulation, and subjected themselves to punishment on a conviction of improper conduct in their business."

The College in the first few years of its existence was unable to erect a building, but it was compelled to rent a suitable place in which to deliver the lectures. The Hall of the German Society, on Seventh Street above Chestnut, was rented; and here for seven years the lectures were delivered. But in 1829, on May 19th, it became necessary, owing to the German Society needing the rooms occupied by the College, to appoint a Committee to endeavor to secure a permanent situation for the College. The following quotations from the Minutes of the College show clearly and succinctly how the first building devoted to pharmaceutical instruction, erected in America, came into being.

On the 21st of November, 1831, the Committee appointed to select a site for a building reported "that two sites for the purpose can be obtained, one situated on the southwest corner of Marble and Tenth Streets (Marble Street running east and west between Chestnut and Market), containing on Tenth a front of 38 feet, and running in depth 60 feet to a 6-foot wide alley, thus presenting a front of three sides; the price asked for this site is \$8,000. The

whole extent of the lot is 96 feet on Tenth Street, running back 92 feet, the asking price being \$20,000." The financial condition of the College at that time is indicated by the following conclusion of the Committee: "As a matter of speculation, it would be preferable to purchase the whole lot, but in the opinion of your Committee it is too heavy a concern to enter into."

"The second lot is situated on the south side of Zane Street, adjoining Six's sugar-house, by which it is bounded on the west; at the east, by a 10-foot wide alley; on the south, by a vacant lot, which is to continue always open, thus presenting three fronts, which is desirable on account of light. The lot is 30 feet on Zane Street, running to a depth of 46 feet."

"The Committee were authorized to offer Abraham Miller \$225 per annum for the lot, on ground rent, redeemable in 20 years for the sum of \$4,500." The Committee were also authorized to obtain subscribers to a loan at 6 per cent. interest for the purpose of erecting a building on the lot.

On the 13th of December, 1831, Abraham Miller informed the Committee of his acceptance of the above offer for the lot.

On April 23d, 1832, the Building Committee were directed to erect a building on the Zane Street lot, as soon as subscriptions to the amount of \$6,000 were obtained.

The Building Committee report on June 24th, 1833: "Subscriptions to the College loan have been obtained to the amount of \$6,300; the Committee proceeded at once with the work."

The following description of the old College building, as it appeared in the eyes of the Committee, may be interesting: "The dimensions of the College are 30 feet 9 inches front, by 40 feet in depth, and four stories high. The first and second stories being sufficiently lofty for lecture rooms, with seats rising as they recede from the speaker's desk. In order to admit light over the most elevated seats, the front windows are larger than usual, and handsomely finished with head-pieces of the best white marble, those of the second story being circular tops. The front or main doorway is finished with an elevated white marble entablature, supported by fluted Doric columns of the same material; the eastern side and back part of the building being open and unobstructed. The Committee availed themselves of this important advantage in location by placing windows so as to admit abundant light and free circulation

of air through every part of the building. The College is 57 feet high, and is surmounted by a battlement cornice of considerable width, which gives a commanding appearance; and your Committee have no hesitation in saying that the whole edifice is excelled by few, if any, of equal dimensions in our city, whether in design and beauty of structure, or in its adaptation to the purposes for which it was erected."

For thirty-five years this building was the home of the College; but, at the end of this time, the necessity for a larger building was imperative. The classes had greatly increased (the class of 1867 numbering 154) and the influence of the College was steadily growing. A Committee was appointed to select a new site. They chose a lot which embraced portions of the properties, Nos. 139, 141, 143 North Tenth Street. The corner-stone for the new building was laid on June 24, 1868. On the 7th of October, in the same year, the College building was opened with appropriate ceremonies. This building was unpretentious in design, no attempt being made to secure architectural beauty. It was commodious, conveniently arranged, and it was believed, at the time, by many of the older members of the College, to be far beyond the needs of the classes. Indeed one officer of the College was heard to say, after inspecting the building, "Where are you going to get the students to fill those rooms?" A few years, however, were only needed to prove the wisdom of the committee who planned the rooms, which were so much larger than those in the old building. An addition had to be made but two years afterwards, when the chemical and pharmaceutical laboratories were established.

The Board of Trustees adopted the policy of gradually buying the properties adjoining. In 1874, the properties Nos. 139, 141, 143 North Tenth Street were purchased, which secured to the College the full width of the lots on Tenth Street. In 1880, four properties on Elwyn Street were bought; and, as the laboratories were growing very rapidly, it became necessary, in 1881, to erect a four-story building in the rear on Elwyn Street. The building furnished a chemical laboratory upon the first floor, a pharmaceutical laboratory upon the second floor, a new chemical lecture room upon the third floor, and an alumni room and quiz room upon the fourth floor.

On May 31, 1889, the Aimwell School property was purchased,



and this addition made the total size of the lots required by the College as follows: 70 feet on Tenth Street and 172 feet in depth to Elwyn Street, with the Aimwell School property, which has a frontage on Cherry Street of 54 feet. The necessity of still more room became apparent (the Class of 1890 numbering 577); and, after much careful consideration, a Committee was appointed to draw up plans and specifications for a new building on the front, which would adequately house the increasing collections of the museum and library, and also provide increased accommodations for the growing classes. In 1892, the plans and specifications of the Committee were adopted by the College, and the erection of the new front building, which had been talked about so long, was assured.

In May, 1892, the work began, and it has been continued actively until the present time, February, 1893. The architect selected was Mr. John T. Windrim, the builder being Mr. Allen B. Rorke. The College Building Committee, who were entrusted with the work of superintending the erection of the buildings, were Howard B. French, Chairman; Charles Bullock, Samuel P. Sadtler, James T. Shinn and Joseph P. Remington.

We have assembled this evening to inspect these buildings and a short description may be of assistance to those who are present. The whole College building, if divided into three nearly equal portions, as they run from Tenth to Elwyn Streets, represent the additions which have been made. The middle portion, which includes the remodeled lecture rooms, is the original building, and it was erected in 1868; the rear building, which includes the laboratories, was built in 1881; and the new front building, just finished, completes the structure. It will be seen that about the same length of time elapsed between the erection of the rear building and the front building, twelve years. The new building is six stories high; the front being built of Seneca Red stone and Pompeian brick; large windows are a prominent feature, affording plenty of light for the rooms. The first floor is arranged to give accommodations for the Library, Actuary's Office and the Board of Trustees' room. The second and third floors, which are embraced in one large room, is used for the Museum and general meeting room. The fourth floor is devoted to providing a room for the Alumni Association and offices for the American Journal of Pharmacy and janitor's quarters.

The fifth floor will be fitted up with seats and desks for an examination room. The sixth floor is used for storage. The basement is furnished with upright ventilated lockers for the use of the students.

Each of the lecture rooms has been remodelled, with folding-chairs and tablet-desks; the seats are arranged in amphitheatre form and they are a great improvement over the old benches. The side yard, which formerly connected the chemical laboratory with the front building, has been converted into an arcade, by enclosing it with a wall and a glass roof. This feature, which is believed to be new, furnishes a large, well-heated and lighted space in which the students may congregate before the lectures.

An additional building to the north of the laboratories provides substantial additions to both chemical and pharmaceutical laboratories; the basement of the new building being used for a boiler room, two large boilers furnish steam for heating the air, and driving a large fan, which sends into each room the proper amount of heated air, being conveyed by a shaft from the roof of the building.

Fire escapes and rapid means of egress from each room, in case of fire, are provided. Every part of the building may be well lighted by daylight, or by both electric light and gas light at night. With these improvements, it is believed that the Philadelphia College of Pharmacy has the best equipment for pharmaceutical instruction that is possible. The additions and improvements have progressed as the necessity for them was made clear.

The following figures, taken from the records, showing the number of students in attendance for the last thirty years, will convey to the minds of all, in the most practical manner, the reasons which influenced the Board of Trustees in deciding to enlarge and improve the accommodations:

Year.	Number of students.	Year.	Number of students.	Year.	Number of students.
1863, . . . .	74	1873, . . . .	293	1883, . . . .	443
1864, . . . .	93	1874, . . . .	251	1884, . . . .	543
1865, . . . .	104	1875, . . . .	270	1885, . . . .	560
1866, . . . .	133	1876, . . . .	294	1886, . . . .	591
1867, . . . .	154	1877, . . . .	265	1887, . . . .	541
1868, . . . .	152	1878, . . . .	316	1888, . . . .	576
1869, . . . .	179	1879, . . . .	334	1889, . . . .	594
1870, . . . .	197	1880, . . . .	332	1890, . . . .	577
1871, . . . .	198	1881, . . . .	367	1891, . . . .	636
1872, . . . .	237	1882, . . . .	370	1892, . . . .	652

It will be seen from these figures that the number of students, at present, is about 650. Of this number, probably one-half are from the immediate vicinity of Philadelphia. The College has become a national institution and nearly every state in the Union has its representatives, with some from South America and a few from Europe. Every year an increasing number of students attend who give their whole time to College work and do not accept positions in drug-stores. A large part of their time is occupied in the laboratories of the College, and nearly all of them have completed their four years of service in a drug-store, gaining a practical knowledge of pharmacy before coming here. The requirement of the College that four years' service in a drug-store, gaining a practical knowledge of pharmacy before being permitted to graduate from the College, is one of those wise provisions of the founders of this institution, which enhances largely the practical value of the diploma. It also furnishes a reason for the retention of the present location of the College. Some of the friends of the institution have questioned the propriety of erecting so valuable a plant just here, at 145 North Tenth Street. But the answer is convincing and leaves no doubt of the soundness of the Board's judgment. Owing to the large number of students, now attending the courses of lectures, who are at service in the neighboring towns and outlying districts, some location convenient to the railroad depots and prominent lines of street cars was necessary. A moment's reflection will show that this building is but five squares from Broad Street Depot, six squares from Ninth and Green Streets Station; about the same distance from the one at Broad and Callowhill; and, nearer to the greatest of all, the new Terminal Depot, which brings a large section of available territory within three squares of the College building. Quite a number of students are also engaged in the cities and towns across the Delaware; and, it must be admitted that in a large city of over one million inhabitants, Tenth Street is not an inconvenient distance from the Ferries. It will thus be seen that the building is about as centrally located to suit the needs of the largest number of those who seek its advantages, as could be selected. The necessities of those who have to come to this building three times, and many of them six times a week, are of paramount importance; an inspection of this building will show that this principle has guided the Committee in the arrangement of every detail. Indeed, it has been with

the view of securing every advantage that could possibly be gained for the students and members of the College, that one of the Committee has toiled so persistently and with such telling effect. Summer and winter, late and early, in health and in sickness, he has ever had in mind the needs of his beloved Alma Mater. You all know to whom I allude, Mr. Howard B. French, the Chairman of the Building Committee; this sketch would be incomplete without this reference to the value of his devoted labors for providing suitable accommodations for the institution, which we all delight to honor, the Philadelphia College of Pharmacy.

Before concluding, there is one consideration which must not be overlooked, and which has an important bearing upon the development of pharmacy in this country. The question which has undoubtedly recurred to the minds of many, who have honored us with their presence this evening, is: "Where has the money come from, to put up these buildings?" Let us begin by asking another question: "Who receives the most benefit ultimately from pharmaceutical education?" In answering the latter question, the reply to the former will be developed. To the latter question the answer is that the *people* of this country derive the utmost benefit from the proper education of the pharmacist. Pharmaceutical education has saved thousands of lives; it has stayed the hand of death an untold number of times; it has not only stood between the physician and patient and guided unerringly the hand of the pharmacist to safety, but it has been the effectual bar between the pharmacist and his poor frail self, with his tendency to err and fail; it has revealed to him the great gulf which yawned below him, into which he was about to plunge his patient, his reputation, aye, himself.

The great educational centres of our country, of which we are all so justly proud, our own University, Harvard, Yale, Johns Hopkins, Princeton, Cornell, and lastly the University of Chicago, are names familiar to all. Scarcely an issue of a daily newspaper can be scanned without seeing a notice of some gift, bequest or endowment to them. Thousands of dollars are yearly pouring into the coffers of these worthy institutions. These have for their object the higher education of the talented youth of our land. For the education of the classes, who have not the means to spend in elaborate training here stands our splendid system of public schools, and an education





# INTERIOR VIEW OF COLLEGE BUILDINGS.

(WITH SOUTHERN WALLS REMOVED.)  
*Basement.*—Students' lockers, Oxygen gasometers, Boilers, Engine, Sturtevant system of heating.

*1st Floor.*—Library, Actuary's office, Prof. Sadler's office, Chemical Lecture Room, Chemical Laboratories.

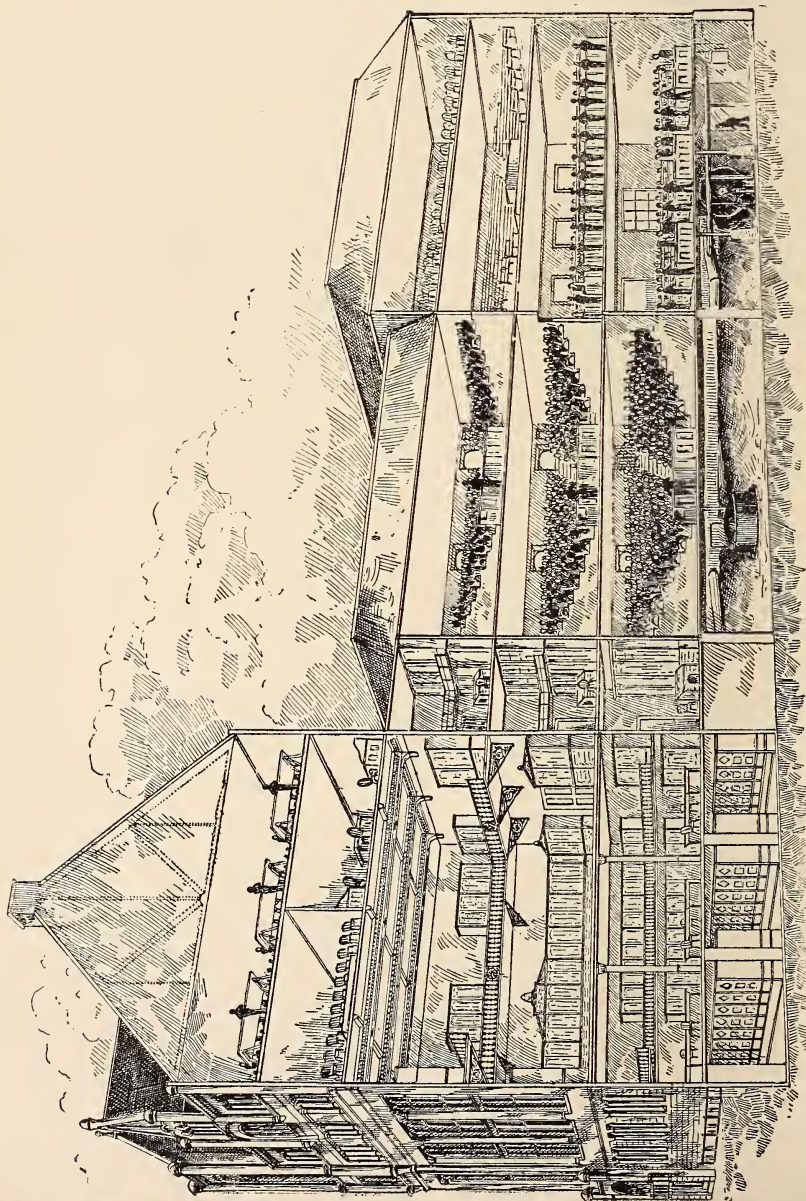
*2d Floor.*—Museum and Assembly Hall, Prof. Remington's office, Pharmaceutical Lecture Room, Pharmaceutical Laboratories.

*3d Floor.*—Museum Balcony, Prof. Maisch's office, Materia Medica Lecture Room, Assistant Professors' Review and Quiz Room.

*4th Floor.*—Alumni Hall and Meeting Room, American Journal of Pharmacy offices, Janitor's quarters, Microscopical Laboratory.

*5th Floor.*—Examination Room.

*6th Floor.*—Storage Rooms.



in the United States is denied to no one. In the case of the Universities, the opulent from their abundance support them; for the public schools, rich and poor alike are taxed for their maintenance; but, when we come to Pharmacy, it will be seen that the highly-favored of this land have entirely overlooked us. Pharmacy has no school tax on which to depend; she has never even applied to the Legislature for an appropriation. The treasury of the Philadelphia College of Pharmacy has been enriched by but one bequest in seventy-two years, that of a small legacy in 1865 for the purchase of books and scientific apparatus. The money which has been spent in this work comes entirely from the "druggists of this country." All honor to them! When the College has needed a new building, there have not been wanting friends of the institution, in the drug trade or in the collateral branches, who have subscribed liberally of their means; and the receipts from the students' fees have paid the debts, until it became necessary to incur the next obligation through the extension of the buildings. The public itself and those not directly interested in the technical work of pharmacy have stood entirely aloof, although no one can deny that the public have received the greatest advantages which flow from higher pharmaceutical education. Pharmacy's educational institutions have had to rely solely on her own votaries. Has not the time come for Pharmacy to make its appeal, to stand up, shoulder to shoulder, with the other Colleges of our land, who are continually asking the public for the necessary sinews of war to carry on the work and has she not a convincing argument when she points to the fact that 12,700 students have, up to this time, received instruction in these halls—impelled here solely by the desire to improve themselves, and fit them for better service to the public, entirely at their own expense?

If immense sums can be annually applied through gifts, bequests, endowments, appropriations from Legislature, and in other ways for the support of Universities and Colleges, which simply give a general education, will it be impossible to ask that a modest sum be set apart, through these same agencies, to aid in pharmaceutical education, whose importance to the general weal is far greater, for through it flow the issues of health or disease, safety or disaster, life or death?

## SOLIDAGO RUGOSA.

BY WILLIAM P. OBERHAUSER, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy,  
No. 120.

Very little has been written about the members of this genus, except *Solidago odora* and *S. Virga-aurca*; the leaves of the former were at one time official.

*Solidago rugosa* grows from one to six feet high, is rough and hairy, especially the leafy stem. The plant flowers during August and September.

A quantity of the plant was collected by myself, during the flowering season, and after careful drying it was submitted to analysis, with the following results:

	Per Cent.
Volatile oil, . . . . .	0'996
Fixed oil, . . . . .	2'210
Wax, . . . . .	0'906
Caoutchouc, . . . . .	1'330
Chlorophyll and resin, . . . . .	4'244
Mucilage, . . . . .	1'900
Dextrin, . . . . .	10'200
Sugar, . . . . .	0'666
Pectin, . . . . .	0'640
Calcium oxalate, . . . . .	0'135
Inulin, . . . . .	0'960
Pararabin, . . . . .	1'000
Lignin, . . . . .	4'690
Incrusting matter, . . . . .	8'580
Cellulin, . . . . .	8'230
Undetermined extractive, . . . . .	9'895
Tannin, . . . . .	2'700
Moisture, . . . . .	9'710
Ash, . . . . .	19'050
Loss, . . . . .	11'958
Total, . . . . .	100'000

A careful search for glucosides and alkaloids in the alcoholic and ethereal extracts of the drug failed to reveal evidence of either.

Considerable quantities of the volatile oils of the flowers and of the leaves were obtained separately by distilling these parts of the plant with water. That from the flowers was a colorless oil having a specific gravity of 0.8486 at 15° C. The oil from the leaves was straw-yellow in color and had a specific gravity of 0.8502 at 15° C.



Both had an odor resembling oil of origanum. They gave evidence by their reactions with iodine and bromine of containing large proportions of terpene. On careful heating both oils commenced to boil at 130° C.

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## DIOSCOREA BATATAS.

BY FREDRICK WM. MEINK.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy,  
No. 121.

Read before the College at the Pharmaceutical Meeting, February 21.

The plant is indigenous to Central Asia, and belongs to the natural order of Dioscoreaceæ. It possesses tubers of various sizes, of a gray-brown color, and resembling small potatoes in appearance.

The tubers were obtained from Professor Maisch, and by his request subjected to analysis.

Fifty grams of the drug were bruised in a mortar, and then extracted with 100 cc. of 95 per cent. alcohol, by macerating for 24 hours. This alcoholic extract was then drawn off, and 200 cc. of absolute alcohol were added to the drug, in two portions, each being allowed to macerate for 24 hours. These three alcoholic extracts were mixed, the alcohol recovered by distillation, and the extract evaporated almost to dryness, when it was treated with petroleum ether, so as to remove the fat and wax. The former was separated from the wax by digestion with 95 per cent. alcohol, and after the evaporation of the alcohol, the fat was found to melt at 100° C., and to saponify with potassium hydrate. The wax was taken up with hot absolute alcohol, and allowed to crystallize.

The alcoholic extract, after treatment with petroleum ether, was then taken up with 25 cc. of acidulated water, and transferred to a separating funnel, and shaken successively with petroleum ether, chloroform and stronger ether, and these allowed to evaporate and then taken up with acidulated water, and tested for alkaloid and glucoside. Reagents for alkaloids gave no reactions, but the chloroform extract gave the characteristic reaction when treated with Fehling's solution. The solution in the separating funnel was then made alkaline with sodium hydrate, and shaken successively with the solvents mentioned before; the separated liquids being treated in the manner indicated. Reactions for alkaloid were again not obtained, but for glucoside the stronger ether extract gave the characteristic reaction when treated with Fehling's solution.

The original drug was then dried, to remove alcohol, and extracted with 500 cc. of water, in two portions, each macerating for 24 hours. Fifty cubic centimetres of this aqueous extract were evaporated to dryness, weighed and then ignited, so as to obtain the amount of organic matter it contained in solution. To 25 cc. of the aqueous extract, 75 cc. of absolute alcohol were added; the precipitated mucilage was collected, washed, and dried at 100° C., and then weighed.

The filtrate was evaporated to a syrupy consistency, on a water bath, and to this 25 cc. of absolute alcohol were added, and the dextrin was precipitated, washed, dried and weighed.

Another 25 cc. of the aqueous extract were precipitated by plumbic acetate, the filtrate freed from lead by hydrogen sulphide, then divided into two equal parts, of which one was used for the estimation of glucose present, and the other part for the estimation of saccharose by inversion with hydrochloric acid and treatment with Fehling's solution.

The drug was next extracted with 500 cc. of sodium hydrate solution, in two portions. Fifty cubic centimetres of this alkaline liquid were evaporated to dryness, weighed and then ignited to obtain the amount of organic matter. Then 25 cc. of the alkaline liquid were made acid with acetic acid, and to this 75 cc. of 95 per cent. alcohol were added, so as to precipitate the albumen and pectin.

By exhausting the drug with acidulated water, a liquid was obtained in which the total organic matter was determined, also calcium oxalate and pararabin.

On boiling the drug with water, the starch was extracted, and after determining the total amount of organic matter, the liquid was boiled with sulphuric acid, and the starch subsequently estimated as glucose.

The residual drug was dried, weighed, and after treatment with fresh chlorine water, to dissolve the lignin, was again dried, weighed and a portion ignited to obtain the amount of cellulin.

A weighed quantity of fresh drug was dried at 110° C., in an air bath, to constant weight, and the amount of moisture the drug contained was then estimated. The residue was ignited and weighed, which gave the amount of ash the drug contained.

One hundred grams of the drug were all that could be gotten,

so 50 grams of this amount were reserved in order to make special tests for the glucoside. The amount of glucoside extracted from this quantity was very small, so no further experiments could be made, but to prove the presence of the glucoside.

In conclusion, it may be said that the principal constituents of this drug are those usually found in plants, together with a glucoside obtainable by exhausting the drug with alcohol, evaporating the solvent, dissolving the residue in water and agitating with ether, which removes the glucoside.

Results of the analysis of *Dioscorea Batatas*:

Alcoholic extract, . . . . .	{	Glucoside, undetermined amount.		
		Fat, . . . . .	'38	
		Wax, . . . . .	'02	
				40
Aqueous extract, . . . . .	{	Mucilage, . . . . .	'20	
		Dextrin, . . . . .	'20	
		Saccharose, . . . . .	'36	
		Glucose, . . . . .	'72	
		Undetermined organic matter, .	2'00	
				3'48
Alkaline aqueous extract, .	{	Pectin and albumen, . . . . .	3'00	
		Undetermined organic matter, .	3'40	
				6'40
Acidulated aqueous extract, .	{	Calcium oxalate and pararabin, .	2'00	
		Undetermined organic matter, .	2'00	
				4'00
Boiling aqueous extract, . .	{	Starch, . . . . .	1'64	
		Undetermined organic matter, .	10'80	
				12'44
Chlorine water, . . . . .		Lignin, . . . . .	'12	
Residue, . . . . .		Cellulin, . . . . .	3'64	
Original drug, . . . . .	{	Moisture, . . . . .	61'62	
		Ash, . . . . .	1'62	
				93'72
Total, . . . . .				93'72
Loss, . . . . .				6'28
				100'00

## ON THE TUBERS OF DIOSCOREA SPECIES.

BY JOHN M. MAISCH.

In 1886 I received a few axillary tubers, said to belong to *Dioscorea bulbifera*; on being planted in the open air in the following spring, a small plant was raised, which produced neither flowers nor axillary tubers. Since the species named is strictly tropical, and the root of the plant in question was not taken up in the

fall, I was surprised at the appearance of stems and leaves in 1888, and annually since then, proving that the root would survive our winters. During the past summer the plant grew in a sunny position, attained a considerable height, and produced flowers and many axillary tubers, which were subjected to analysis by Mr. Meink. Most of the leaves, particularly on the upper branches, were opposite or in whorls and the plant could therefore not be the one named above, which has the leaves *never* opposite; Mr. Thos. Meehan kindly identified the plant, and confirmed the opinion that it is merely the Chinese yam, *Dioscorea glabra*, *Roxburgh*, or *D. Batatas*, *Decaisne*, which was brought to the notice of the French Academy nearly forty years ago as a valuable food plant by *Decaisne*.

The genus *Dioscorea* comprises about 150 species, nearly all of them confined to tropical or subtropical countries. A number of these species have large tuberous roots, which on account of the starch present in them are used as food, and are generally known as *yam*; the tubers growing in the axils of the leaves of some species, it appears, may likewise be utilized. But many of these products in their natural state are bitter or acrid, and are known to possess poisonous properties, which, however, are removed by washing with water, or with alkalies, or by boiling or roasting.

Messrs. Heckel and Schlagdenhauffen have recently made a study (*Revue des Sciences natur. appl.*, March, 1892) of the tubers of *Dioscorea bulbifera*, *Linné*, and ascertained that in the Gaboon country of tropical Africa, the aërial tubers are looked upon as being decidedly poisonous, while in other French colonies they are considered inoffensive. Working with the aërial tubers procured from the Gaboon country, they separated with petroleum benzin some wax and chlorophyll, and then exhausted the residue with alcohol; this extract on being treated with water left some resin behind, while yellow coloring matter, saccharose and a bitter principle went into solution; this solution injected subcutaneously proved poisonous to frogs and was shown to contain a glucoside. The authors found the underground tubers to be entirely free from this toxic principle.

It is of interest to note the fact that Mr. Meink's investigation has also shown the presence of a glucoside in the aërial tubers of the Chinese yam, and it remains to be determined whether it also possesses poisonous properties. With the exception of the two



species mentioned, these bitter principles do not appear to have been subjected to chemical research; in fact, but very few analyses of yam have been placed on record. The earliest one found by me was published in 1802, in Scherer's Journal on *Dioscorea sativa* by Suersen (I); one in 1852 by Payen on *D. alata* in *Compt. rend.* XXXV (II); one credited to Boussingault, species not mentioned in *Fahresbericht*, 1855 (III); one by Frémy on the tuberous roots of *D. Batatas* in *Compt. rend.* XL (IV); those by Heckel and Schlagdenhauffen mentioned above on the subterraneous (V) and on the aërial (VI) tubers of *D. bulbifera* and finally the present one by Meink on the aërial tubers of *D. Batatas* (VII). For convenience of comparison the results may be tabulated as follows:

	I.	II.	III.	IV.	V.	VI.	VII.
Water, . . . .	67.58	77.05	82.6	79.3	69.234	67.445	61.62
Salts, . . . .	—	1.90	1.3	1.1	0.3076	1.013	1.62
Cellulose, . .	6.51	1.45	0.4	1.0	18.4113	31.542	36.76
Starch, . . . .	22.66	16.76	13.1	16.0	3.6950		
Mucilage, . .	2.94				—		
Sugar, . . . .	0.26	—	0.2	1.1	16.9223		
Fat, . . . . .	—	0.30			0.1584		
Resin, . . . .	0.05	—	—	—	—	1.2750	
Albuminoids, .	—	2.54	2.4	1.5	—		

The detailed results of (VI) calculated for the anhydrous substance were as follows: Wax and chlorophyll, 0.70; saccharose, yellow color and bitter toxic principle, 3.30; resinous matter, 0.50; albuminoids, 5.31; starch, 52.22; cellulose and lignin, 34.81; fixed salts, 3.16.

## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*Chocolate pastilles.*—V. J. Péquart recommends chocolate in pastilles for exhibiting disagreeable and difficultly administered medicaments, and gives the following procedure, taking calomel as an instance of insoluble medicaments, and santonin of those which are soluble:

(1) Beat the chocolate in a warm mortar and incorporate the calomel, either alone or mixed with aromatized sugar. Excessive heat will cause partial oxidation, blanching the pastilles and alter-

<sup>1</sup> Includes also gluten-casein.

ing the mass ; it is, therefore, best to work at a temperature of about 25° C. If the powder to be incorporated is bulky, it might be of advantage to add cacao butter, in the proportion of two parts of the butter to one of powder.

(2) Medicaments which are very soluble, are preferably incorporated with the chocolate in solution, taking care, of course, to use a vehicle which is not incompatible with the chocolate. Santonin is soluble in five times its weight of chloroform ; this will liquefy the chocolate, but will be largely evaporated during the manipulation ; however, the pastilles will retain the taste of chloroform for some days.

Another way would be to dissolve the santonin in ten times its weight of cacao butter or in five times its weight of castor oil. In this latter case, however, it would be necessary to add some sugar for maintaining the consistence, and also to mask the taste of the castor oil, which is stronger than that of the chocolate.

For the division of the pastilles M. Péquart uses two tubes, one inserted in the other, the inner one receiving the mass, while the outer one serves as a water-bath. The mass is forced through the tube by means of a piston, and as it emerges is cut by one or more knives fastened to a beam worked by the crank for driving the piston. It is obvious that by properly regulating these parts, pastilles of a uniform weight and containing a definite amount of the medicament may be obtained.—*L'Union pharm.*, Jan., 1893, p. 7.

*Chloralose*.—This name is proposed by Hanriot and Richet for a body which they obtained from the combination of chloral and glucose, and with which they obtained excellent results as a hypnotic. They are of the opinion that M. Hefter, who had previously mentioned this substance, but who considered it very toxic, did not obtain it in a state of sufficient purity. For its preparation equal quantities of anhydrous chloral and dry glucose are mixed and heated to 100° C. for one hour. Upon cooling treat the thick mass with a little water and then with boiling ether. By removing the ether-soluble portions, adding water and distilling five or six times with water, until all the chloral has been driven off, a residue is obtained, which by successive crystallizations is separated into two bodies ; the first of these, slightly soluble in cold water, but soluble in hot water and alcohol, is *chloralose*, and for the second, difficultly soluble even in hot water, which is probably the cause of its inac-

tivity, the name *parachlorose* has been proposed.—*Nouveaux Remèdes*, Jan. 24, 1893, p. 29.

*Butylhypnal* or *chloral-antipyrine* occurs in the form of colorless, light crystals, more or less bulky according to the degree of concentration of the mother-liquor. The odor recalls that of butylchloral, and the taste is bitter and disagreeable; it is very soluble in hot water, alcohol, ether, benzin, and chloroform. Its solution is colored red by perchloride of iron and yields an abundant precipitate with picric acid. Under the influence of alkalis butylhypnal is decomposed into antipyrine, alkali formiate and propyl-chloroform. It promptly reduces solution of permanganate of potassium when heated, and but slowly in the cold.—*Four. de Pharm. d'Anvers*, Jan., 1893, p. 16.

*Coryl*, is a new anæsthetic of considerable value in dentistry and minor surgery. It is a mixture of methyl chloride and ethyl chloride. Though it does not produce as great a cold as methyl chloride, it has the advantage of being still liquid at 0°, while the latter boils at — 27° C.—*Four. de Pharm. d'Anvers*, Jan., 1893, p. 16.

For a local anæsthetic, the venerable Dr. Parsons recommends the following formula: Chloroform, 12; tincture of aconite, 12; tincture of capsicum, 4; tincture of pyrethrum, 2; oil of cloves, 2; camphor, 2. The camphor is first dissolved in the chloroform, and the oil of cloves and the tinctures are then added.—*L'Union pharm.*, Dec., 1892, 549.

*Creolin pills*.—Creolin is not only used as an external disinfectant but also as an internal remedy in choleriform affections. M. Hofman (*Four. de Pharm. d'Anvers*, Nov., 1892) recommends the following formula: Creolin, 5 gm., and kaolin, 15 gm.; to be divided into 100 pills, and preserved in talc. This preparation forms a perfect emulsion with water. The pills may be coated with keratin to prevent the evaporation of the creolin; but salol-coating is preferable, as the salol acts as an intestinal disinfectant.

*Aristol*.—M. Séguier, in the course of an essay on the clinical uses of aristol, gives the following formulas for exhibiting this medicament:

*Collodion*:—Aristol, 1 gm.; flexible collodion, 9 gm. *Ointment*:—Aristol, 10 gm.; olive oil, 20 gm.; lanolin, 70 gm. *Crayons*:—Aristol, 0.10 to 0.50 gm.; cacao butter, 5 gm.—*Four. de Pharm. et de Chim.*, Novbr., 1892, 456.

*Elimination of iodides* which pass in the urine, and especially of potassium iodide, commences two or three minutes after their ingestion. In healthy individuals it is prolonged for at least thirty-six hours after administration in doses of 0.3 to 1 or 2 gm. After large and repeated doses the elimination continues for eleven days or more. The liver contains five times more of the potassium iodide than the blood and muscles, and the urine contains ten times more than the blood.

*Quinine sulphate*, given in doses of 0.50-1 gm. to healthy persons, is eliminated in about forty-eight hours, the elimination commencing in the first half hour after its ingestion.—M. J. Roux, in *Jour. de Pharm. et de Chim.*, Nov., 1892, 457.

*Solution of musk in glycerin* for hypodermic injections is easily prepared according to M. Lambotte (*Jour. de Pharm. d'Anvers*) by mixing the alcoholic tincture of musk with half its volume of glycerin, allowing the alcohol to evaporate and then adding sufficient glycerin to make it equal in volume to the tincture first employed.

*Subcutaneous injections of sodium phosphate* are used by Crocq with good results in nervous affections; he uses a solution of 2 gm. in 100 gm. of cherry laurel water, of which about 3 ccm. are injected under strict antiseptic precautions. He considers it a powerful nerve tonic when used in this manner.—*Gaz. médicale de Liège*, Oct., 1892.

*Cupric phosphate* is used by Saint-Germain for hypodermic injections in the treatment of tuberculosis. Dr. Luton employed copper-salts for this purpose (see *Amer. Jour. Pharm.*, 1887, p. 559), but the method fell into disuse. The author employs the following formulas:

(1) Crystallized sodium phosphate, 5 gm., distilled water and glycerin, of each, 30 gm.

(2) Copper acetate, 1 gm., distilled water and glycerin, of each, 20 gm.

The two solutions are mixed without filtering the mixture. An injection of this, in its immediate effect, presents analogous action to an injection of Koch's liquid.—*Rev. de Thér.*, Jan., 1893, p. 50.

*Alcoholic extract of male fern*.—Lanara uses the following in the treatment of eczema with good results: Alcoholic extract of male fern, 30 gm.; alcohol, 15 gm.; extract of myrrh and extract of opium, of each, 4 gm. This is applied twice a day after washing the



affected parts with green soap and removing the scab.—*Vratch*, 1892; *Nouveaux Remèdes*, Jan., 1893, p. 23.

*Sulphoricinate of sodium*.—A. Berlioz prepares this salt as follows: To one kgm. of castor oil, 250 gm. of pure sulphuric acid of 66° B. are added in small quantities and with constant stirring, to avoid any rise in temperature. Stand aside for 12 hours and add 1,500 gm. cold water; agitate and remove the aqueous layer, which gradually separates. Then to remove excess of sulphuric acid, wash a number of times with water, which contains 100 gm. of table salt per litre, and which has previously been heated to 60–70° C. Carefully add, under constant stirring, soda lye to a feebly acid reaction; let stand for two or three days, decant and filter.

*Sulphoricinated phenol*, used for the treatment of diphtheria (see *Amer. Jour. Pharm*, 1891, p. 195) and prepared with sodium sulphoricinate, made in the manner indicated, will retain its transparency at ordinary temperatures.—*Four. de Pharm.*, Jan., 1893, p. 10.

*The action of sulphuric acid on citrene* has been studied by G. Bouchardat and J. Lafont (*Four. Pharm. et Chim.*, Jan., 1893, p. 49), who find that thereby inactive polymers of this hydrocarbon are formed, the most abundant of which is *diterpilene*  $C_{20}H_{32}$ . The action of sulphuric acid on the camphenes appears to give entirely different results from those which the authors obtained with bivalent citrene, and with monovalent terebenthene.

*Ceratonia Siliqua*, L.—Ed. Heckel and F. Schlagdenhauffen have established the constituents of *St. John's bread*, following Dragen-dorff's method of plant analysis:

Petroleum ether extract, wax and fatty bodies, . . . . .	0'3
Alcohol extract, . . . . .	{ Glucose, . . . . . 13'0
	{ Saccharose, . . . . . 26'366
	{ Fixed salts, . . . . . 0'262
	{ Free butyric acid, . . . . . 0'500
	{ Wax, tannin and coloring matters, . 4'501
Aqueous extract, . . . . .	{ Glucose, . . . . . 4'165
	{ Saccharose, . . . . . 5'835
	{ Fixed salts, . . . . . 1'500
	{ Pectin, albuminous matter, gum, . . 7'75
Incineration, . . . . .	Fixed salts, . . . . . 0'675
Difference, . . . . .	Cellulose, . . . . . 34'946
Loss, . . . . .	0'200

100'000



coloring principle passes into the chloroform layer and is turned blue by ammonia. *Red Saunders*, the yellowish-red color is imparted to the chloroform, ammonia entirely decolorizing.—De Groot, *Oesterr. Ztschr. f. Pharm.*, 1892, 824.

*Sodium peroxide*,  $\text{Na}_2\text{O}_2$ , contains 41.02 per cent. oxygen, of which one-half is available as a bleaching agent. The anhydrous oxide is produced when sodium burns in dry air or oxygen; when the monoxide or its hydrate is strongly heated in a current of air; also by the ignition of sodium nitrate. It is not decomposed by strong heat, but boiling the aqueous solution readily effects decomposition. The hydrated peroxide results by adding hydrogen peroxide to a twenty per cent. solution of sodium hydrate and can be precipitated by the addition of alcohol. For the properties of the compound see *Am. Journ. Pharm.*, 1893, 9.—*Südd. Apotheker Ztg.*, 1892, 411.

*The determination of hardness in waters* by means of standard soap solutions must be carried out at a temperature of  $15^\circ \text{C}$ . if reliable results are to be obtained; higher temperatures notably decrease the persistency of the lather even with an excess of soap solution.—Buchner, *Chemiker Ztg.*, 1892, 1954.

*Salicyl-acetic acid*,  $\text{C}_6\text{H}_4(\text{OC}_2\text{H}_3\text{O}_2)\text{COOH}$ , an acid for which superior antiseptic properties are claimed, is made by the action of disodium salicylate upon sodium monochloracetate at a temperature of  $120^\circ \text{C}$ .; by the decomposition with dilute hydrochloric acid this new acid is separated and freed from sodium chloride by washing with cold water; after drying, cold ether will remove any free salicylic acid and the salicyl-acetic acid is purified by crystallizing from boiling water, forming lustrous laminae. It melts at  $188^\circ \text{C}$ . and is very difficultly soluble in cold water, ether, chloroform and benzol, easily soluble in boiling water and alcohol. The antipyrine salt of this acid (melting point  $145^\circ \text{C}$ .) made by the combination of one molecule of each is claimed to have certain advantages over salipyrine because of its stronger antiseptic action.—*Pharm. Centralhalle*, 1893, 41.

*Salicylic acid* in presence of phenols cannot be colorimetrically estimated in aqueous solutions; in alcoholic solution, however, only the former reacts with ferric chloride. Dr. A. Fagans furnishes the following working method: The liquid to be examined is acidified and extracted with ether; the ethereal solutions are evaporated and

the residue dissolved in 25–30 cc. absolute alcohol placed into a graduated tube of 12–16 mm. diameter; into a similar tube is placed an equal quantity of a 0.02 per cent. solution of salicylic acid in absolute alcohol. To both solutions a 5 per cent. alcoholic ferric chloride solution is added until the maximum intensity of color results; by adding alcohol to one of the tubes until the colors are of the same intensity and then noting the volume of each solution the data are obtained for calculating the salicylic acid. It was found possible to make estimations even if the phenols were present in the proportion of 800 parts to one part salicylic acid.—*Chemiker Ztg.*, 1893, 69.

For the detection of iodine in organic compounds, H. Thoms recommends the addition of concentrated sulphuric acid assisted by heat if necessary; the evolution of violet-colored vapors is very characteristic.—*Pharm. Centralhalle*, 1893, 10.

*Iodoso-benzoic acid*,  $C_6H_4(OI)COOH$ , is made by the action of fuming nitric acid upon ortho-iodo-benzoic acid,  $C_6H_4I_2COOH$ ; purified by recrystallization from water it forms small, pale-yellow laminæ, melting at  $209^\circ C.$  with decomposition. With warm, acidulated potassium iodide solution iodine is liberated and the ortho-iodo-benzoic acid regenerated. Medicinal uses are to be found for this new compound.—*Pharm. Centralhalle*, 1893, 26.

The melting point of cocaine hydrochlorate given as  $181.5^\circ C.$  in a number of standard works of reference is erroneous; Dr. W. Kinzel ascertained that the melting point of the pure salt was  $201$ – $202^\circ C.$  and this was confirmed by other investigators. The low melting point is ascribed to the presence of small quantities of other alkaloidal salts.—*Pharm. Ztg.*, 1893, 25.

The adulteration of saffron with wheat-flour has been shown by Dr. Herz and Professor Hanausek. To decrease the loss occasioned by drying the stigmas are dusted with a fine powder, capable itself of absorbing moisture and coloring matter; mineral powders being so readily detected, flour is used as a substance, cheaply and conveniently obtainable, which is a good absorbent, and, what is more to the point, something that no one looks for. The microscopic examination for flour must be conducted with care, since the strong coloring power of the coloring matter notably interferes with the recognition of the adulteration; the best method for detecting the starch granules consists in suspending the sample in the finest olive



oil.—(Ztschr. f. Nahrungs.-Unters. Hyg. u. Waarenk.) Pharm. Ztg., 1893, 40.

*The alkaloids of Corydalis nobilis Pers.* were extracted by treating the powdered root with 96 per cent. alcohol, evaporating and proceeding by Dragendorff's method. The root collected in summer gave 1.95 per cent. total alkaloids; collected in autumn 1.46 per cent., while the herb yielded only 0.12 per cent. Benzol extracts from the acid solution an amorphous white base, which may also be obtained in colorless crystals, and the salts of which have a bitter taste; its composition is  $C_{21}H_{21}NO_6$ ; by oxidation products are obtained resembling in some respects those obtained from hydroberberine, also from a base of *C. cava* (Am. Jour. Pharm., 1890, 396). On rendering the acid solution alkaline, a brown resinous mass is separated, from which benzol extracts a base, crystallizing from boiling water in fine needles, having the formula  $C_{22}H_{25}NO_5$ . This *corydalinobiline* gives with concentrated nitric acid a blood-red color; inorganic acids form no well-crystallized salts; bitter taste resembling quinine. The alkaline solution obtained as above yields to chloroform several bases, of which four were obtained in crystals and distinguished as  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  alkaloid. Indications of the presence of hydroberberine and berberine were also obtained. The  $\delta$  alkaloid, berberine and a fluorescent substance were obtained from the herb.—Ernst Birsman (Dorpat Dissert.), Phar. Post, 1892, 1304.

*The activity of male-fern* has been ascribed by Poulson to *filicic acid*, which also is the poisonous constituent (Amer. Jour. Phar., 1891, 288 and 487). Prof. R. Kobert now calls attention to the fact that the activity of the male-fern is partly due to volatile oil and that the removal of the fixed oil would also include the removal of the volatile oil. One of the reasons for this statement is that the pure filicic acid given in very large doses without the addition of the oil did not accomplish what a much smaller dose of the acid mixed intimately with the fixed and volatile oils of filix accomplished.—Pharm. Post, 1892, 1325.

*The microscopic recognition of coriamyrtin*, the poisonous glucoside of *Coriaria myrtifolia* L., succeeds by placing a section or particle of the leaf in an old solution of potassio-mercuric iodide; in a short time the object appears almost black, due to the reaction of the cell contents with the reagent; on now suspending the object in

strong alcohol, the dark compound is dissolved and a green color developed. The addition of a single drop of a strong sodium hydrate solution causes an immediate purple-violet coloration, while from the object separate minute deep-red granules; the color first forms in the outer portion and travels inward. After 10–15 minutes a yellow precipitate remains; the addition of water notably hastens this change. From the behavior towards these reagents it follows that the coriamyrtin is present in all parts of the mesophyll.—Dr. T. F. Hanausek, *Pharm. Post*, 1892, 1333.

*Constituents of gutta-percha*.—(1) *Gutta*, a white, amorphous hydrocarbon ( $C_{10}H_{16}$ )<sub>n</sub>, melting at 53° C., soluble in chloroform, carbon disulphide, fixed and volatile oils and in hydrocarbons altered by light and air, forming a yellow, friable mass partly soluble in alkalies and alcohol and incompletely soluble in the first-mentioned solvents. (2) *Alban*,  $C_{40}H_{64}O_2$ , melts at 195° C., soluble in hot alcohol (upon cooling separates in small, lustrous scales) and the usual solvents, but insoluble in water and alkalies; heating with alcoholic potassic hydrate solution yields a hydrocarbon *albene*. (3) *Fluavil*, friable, yellow, amorphous ( $C_{10}H_{16}O$ )<sub>n</sub>, melts at 82–85° C.; has the same solubilities as alban. (4) *Guttan*, an unstable compound, in many respects resembling gutta. These constituents obtained from an authentic sample of gutta-percha from Payena Leerii are identical with those obtained from the commercial article. Of the constituents *gutta* is the one showing the characteristic plasticity of gutta-percha; alban does not interfere in the value of the gutta-percha, while the presence of any considerable quantity of fluavil makes its brittle. All of these substances are indifferent to the ordinary chemical reagents; but the alteration of the gutta and guttan by exposure to light and air, also to electrical influences, causes a deterioration of the gutta-percha, although it is not possible to say at present if these decomposition products are related to fluavil and alban.—Otto Oesterle, *Arch. der Pharm.*, 1892, 641.

## THE "EARTH SUGAR" ROOT OF THE TAMILS.<sup>1</sup>

BY DAVID HOOPER.

The sweet roots used in Indian medicine chiefly belong to plants of the natural order Leguminosæ, and consist of *Glycyrrhiza gla*.

<sup>1</sup> *Phar Jour. and Trans.*, Jan. 7, 1893, p. 548.

*bra*, *Abrus precatorius*, *Taberniera nummularia* and *Alysicarpus longifolius*. The first of these is the well-known liquorice, and the remainder are called wild liquorice and are used as substitutes for the true kind. Besides these, in Southern India, a drug described in native works of great antiquity and sold in the bazars, is the *Poomichacarei kalung*, derived from *poomi*, the earth, *chacarei*, sugar, and *kalung*, root. The botanical origin of this root has only recently been discovered through the industry of Dr. P. S. Mootoosawmy, of Tanjore, who sent a botanical specimen of the plant yielding the drug to Mr. M. A. Lawson, who identified it as *Mærua arenaria*, a plant belonging to the natural order Capparideæ. The "earth sugar" root is mentioned in a very old work of the Tamil medical writers, called *Pædatasintharmini*, written in the usual poetical manner by Karsimrouther centuries ago. He says it "cures skin eruptions, all venereal affections, fever, piles and strenghtens the human system." Dr. Ainslie, who wrote nearly seventy years ago, and to whom we are indebted for bringing so much light upon the drugs of the Hindus, describes, in his "*Materia Indica*," II, p. 330: "This root, in external appearance, is not unlike liquorice root; it also somewhat resembles it in taste, but is not nearly so sweet; it is prescribed, in decoction, as an alterative and diet drink. I have not been able to ascertain from what plant it is procured, but hope that future research may be more fortunate. What I saw of the *poomichacarei kalung* was brought to me from the medicine bazar of Trichinopoly, and was said to have been gathered in the woods of Malabar."

As above stated, the botanical origin of this drug has only recently been discovered. Dr. P. S. Mootoosawmy, of Tanjore, sent a flowering and fruiting specimen of the plant yielding the drug to Mr. M. A. Lawson, of his station, and it was identified as *Mærua arenaria*, H. F. and T., belonging to the natural order Capparideæ. The plant was found rather abundant near Tanjore, but its habitat is described as being in the most unfrequented and inaccessible woody parts of the Circar Mountains, flowering during the cold season. The "*Flora of British India*" says it is found in the West Himalaya and in Central India.

Roxburgh describes this plant under the name of *Capparis heteroclita*, R. It is a large unarmed climbing shrub; leaves elliptic, corymbs terminal, calyx four-cleft; corolla regular, four-petalled;

stamina on the receptacle, which is as long as the tube of the calyx. The most remarkable part of the plant is the fruit; this is a beaked berry two to five inches long, deeply constructed between the seeds, fleshy, elongate, moniliform, one or more seeded. There is only one seed in each single berry or lobe of the compound fruit. Roxburgh further remarks that the Telugu name is *Putta-tiga*, and that the unripe fruits are boiled and eaten by the natives.

The roots are plump when fresh, from 1 to 1½ inch in diameter, long, cylindrical, contorted, with a light brown surface. When dried they become darker in color and wrinkled longitudinally, and several irregularly disposed transverse markings of a lighter color are observed on the surface. The transverse section of the root exhibits a central hard woody centre of a yellowish color, and several similar but smaller woody bundles are scattered throughout the waxy looking parenchyma of the cortical portion. In the bazars the drug is sold in circular discs, like calumba root, having been sliced transversely when in a fresh state and allowed to dry in the sun. The taste is sweet and mawkish, and there is no distinctive odor as there is in liquorice root.

Earth-sugar root is used by Mahomedans and Hindus as a sexual stimulant and tonic, antisypilitic and alterative. It can be used either in a fresh or dried state. The outer brown covering is supposed to be harmful, and is removed previous to use. The way in which this and other roots are purified before they are taken as medicines, is rather peculiar. It consists in putting a sér of cow's milk diluted with an equal quantity of water into a vessel, and covering its mouth with a clean cloth, which is then tied round the neck. The bruised root is laid on the cloth and covered by another inverted vessel. The milk is then boiled and the vapor is supposed to purify the root, which is afterwards dried, finely powdered and kept ready for use.

I requested Dr. Mootoosawmy to make some definite trials of the drug on his patients, but he has not been able to do this to any great extent. He gave the root in a powdered state, in drachm doses, mixed with sugar candy for gonorrhœa and syphilitic complaints, and also administered a decoction of the root. He recommended a mixture of the root, prepared with mutton broth, for patients suffering from chronic diarrhœa and dysentery, a prescription used by native physicians. From an analysis of the drug,



I am, however, inclined to the opinion that it possesses very little, if any, medicinal action, and that if any benefit resulted from the use of the above prescription, it would more likely be due to the mutton broth than the root of *Mærua arenaria*.

Sections of the root examined by the microscope exhibited no starch or crystalline matters in the cells, but yellow, granular matter and oil globules were present. The central woody column and woody bundles in the cortical portion were made up of large lignified cells.

The finely powdered root lost 11.26 per cent. of moisture, and left 6.6 per cent. of mineral matter when ignited. The ether extract amounted to 4.22 per cent., and consisted of fatty acids of a brownish color and fluid consistence. After standing a few days, white crystals formed, which were collected and pressed between folds of blotting paper, and recrystallized from boiling alcohol. This insoluble portion had the properties and melting point (62° C.) of palmitic acid. Oleic acid was present in the fluid portion of the extract.

The alcoholic extract contained a large quantity of saccharine matter, which reduced Fehling's solution to a very slight extent. A small quantity of an organic acid was removed from solution by plumbic acetate, but no substance similar to glycyrrhiz could be detected. The absence of an alkaloidal principle was proved after the application of the usual reagents.

The aqueous extract contained an additional quantity of sugar, and when heated to the boiling point threw out an abundance of white flocks of albumin. A large quantity of the root was exhausted directly with water, and the extract heated to separate the insoluble albumin, and filtered. The syrup was then boiled in an inverted condenser with 1 per cent. sulphuric acid for three hours. The sulphuric acid was removed with barium hydrate solution, and the syrup, estimated with Fehling's test, indicated the presence of 41.2 per cent. of invert sugar. This sugar showed no disposition to crystallize, and when examined in a Laurent's polarimeter, it had no action on polarized light.

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*Asafetida* has been successfully administered in Italy in threatened abortion (*Centralbl. f. Gynäk.*, 1892, No. 9). Dr. Turazza followed Negri's treatment, giving in the beginning of pregnancy, *asafetida* 0.1 gm. twice daily gradually increasing the dose to ten pills, and then slowly reducing it till confinement.

THE MANUFACTURE OF PEPSIN AND DETERMINATION OF ITS PROTEOLYTIC POWER.<sup>1</sup>

Pepsin, the active principle of the gastric secretion, is an albuminous principle secreted by glands imbedded in the tissue of the inner coating of the stomach; it is a colloid, differing from ordinary albumin in its behavior with nitric acid, not giving the yellow xanthoproteic reaction, and is soluble in water and glycerin. When in solution it is destroyed by boiling, by strong alcohol, by alkalies, and by most metallic compounds. Pepsin acts on nitrogenous matters only when in slightly acid solutions. At present it is almost exclusively prepared from pigs' stomachs, the digestive secretions of the sheep, calf and ox being less active. Various processes of making pepsin have been and are still followed; none of them yields an absolutely pure product, though the digestive power of some kinds of pepsin is very high indeed. Ten years ago an article, possessing a digestive power of fifty times its weight, was considered very good, but now it is expected that 1 grain of pepsin should, under certain conditions, digest 2,000 grains of hard-boiled white of egg.

Commercial pepsin was first prepared by cutting up pigs' stomachs into small pieces, macerating these in slightly acidulated water, filtering the solution, and evaporating it at a low temperature to dryness. Next, it was thought to improve the process by taking the filtered pepsin solution and precipitating it by means of basic acetate of lead, decomposing the precipitate by sulphuretted hydrogen, and evaporating the filtrate, either by itself, or with the addition of sugar of milk. These processes were naturally tedious, the pepsin so prepared had almost always a putrid odor, it was liable to contain lead and other impurities, and it possessed very little digestive power.

*Beal's Process.*—Dr. Lionel Beal suggested taking the inner coat of the fresh pig's stomach, and after well washing and cleansing it, to scrape it with a blunt knife, and dry the viscid fluid so obtained on glass plates; to afterwards treat it with benzol, ether or chloroform, to extract fat, again dry it and reduce to fine powder. This process is accepted and published in the British Pharmacopœia. The pepsin so prepared is described as *sparingly* soluble in water; but since the active principle of pepsin itself is soluble, that does not

<sup>1</sup> Pharmaceutical Journal and Transactions, January 21, 1893, p. 588.

speaking well for the purity of the article; in fact, the principal constituents of it are mucus and epidermal tissue, as might be expected from the mode of preparation.

Bearing in mind that the peptic glands are imbedded in the inner coating of the stomach, and that the Pharmacopœia admits a great deal of impurity or insoluble matter, manufacturers were led to take the inner coatings of the pig's stomach, stripped from the less active outer fleshy portion, wash, dry and powder them. Thus was prepared, in a very simple and easy manner, a kind of pepsin, corresponding to the Pharmacopœia requirements, and found to possess very great strength. This process has been much improved and perfected; it is now extensively carried out by some houses in America and the product sold in the market as insoluble pepsin. The fresh pigs' stomachs are cleaned and the inner coatings stripped off; these coatings or skins are then trimmed from all adhering fat, again thoroughly washed and scrubbed in cold water, and when perfectly clean and free from mucus and blood, they are packed in barrels filled with cold water, with lumps of ice on top, and left to stand overnight, to still further remove any blood or impurities. Next morning they are again washed and scrubbed. Thus washed until free from mucus and blood, they appear quite white and clean. The membranes are then spread out on linen sheeting extended over frames, care being taken to prevent overlapping, and are quickly dried at a low temperature, in a properly arranged drying room. They dry to horny semi-transparent sheets which, when coarsely powdered, are treated with benzol, ether or chloroform, to remove fat, then dried again and reduced to a very fine powder. It is not advisable to carry the powdering too far, but best to collect only the first few siftings, and to leave an appreciable amount of residue. The first siftings possess the greatest digestive power, the powder obtained afterwards being less active and containing most of the inert epidermal tissue. The siftings have therefore to be tested from time to time, and pulverization stopped as soon as the powder becomes deficient in strength. It is an important fact that notwithstanding the long and repeated washings of the coatings of the stomach, the pepsin ultimately obtained by this process is of great strength, 1 grain dissolving readily about 2,000 grains of finely divided coagulated albumin. There can be no doubt that during the washing all the ready formed pepsin must have been removed,

but the peptic glands produce fresh peptic secretion, which is retained and dried in the skins. It would seem that the peptic ferment, when reduced to powder in the very glands where it has been generated, retains, in a very high degree, its active digestive power, so that when mixed with warm acidulated water and albumin, it proves equal, if not superior, to any pepsin made by a more complicated and more scientific process.

*Scheffer's Process.*—Scheffer availed himself of the fact that albuminous matter is thrown out of solution by the addition of salt in sufficient quantity to form a nearly concentrated solution of pepsin. In following this plan, it is found that ordinary albuminous matter is far more easily precipitated by salt than pure pepsin, in fact it appears that pure pepsin in solution, when treated with salt, is not fully precipitated, but floats about in the salt solution without either rising or falling. When ordinary albuminous matter is present, however, it carries the pepsin mechanically with it to the surface.

In making pepsin by Scheffer's process, the inner coatings of the fresh pig's stomach, which contain the greater portion of the peptic secretion, are stripped off from the outer fleshy portions. Immediately after killing, and while the stomachs are still warm, this can be easily effected. After being well washed, both the inner and the outer coatings are separately passed through a mincing machine, and each is separately macerated in cold water acidulated with hydrochloric acid. In operating upon 200 stomachs, the inner coatings weighed about 103 pounds when mixed, and occupied a bulk of about 10 gallons; the outer coatings, when treated in like manner, weighed and measured a little more. Each of these portions was put in a 70-gallon cask, which was filled with cold water, to which 32 ounces of strong hydrochloric acid had been added. These two masses were from time to time well stirred, and allowed to stand over night. Next morning, after another good stirring, they were strained separately through canvas bags about 3 feet 4 inches long, tapering down to a bottom about 5 inches square, the top circumference of the bag being about  $4\frac{1}{2}$  feet. One bag like this will hold and drain the 200 minced stomachs. After allowing the liquors to drain off, it is advisable to make a preliminary test, to ascertain their behavior with salt. The liquor from the inner coatings strains more readily than that from the fleshy portions, and there is more of it. Should the solutions appear milky, and strain and filter badly,



sulphurous acid may be added, with a little talc, and after being allowed to deposit and clarify, they may be strained again. The liquors from the fleshy portions, when saturated with salt, give a dense flocculent precipitate, which rises readily, leaving the fluid below perfectly clear; such a precipitate drains, presses and dries well, but its digestive power is weak. When the liquors from the inner coatings are similarly saturated with salt, the precipitate appears watery, remains floating about in the fluid, and will either pass through the straining cloth, or block the pores, and not strain or drain at all. Separation of the precipitate by pressing offers great difficulties, but the small quantity so obtained, when dried and powdered, will possess great digestive power. By mixing the two liquors, or by adding just enough liquor from the fleshy portions to the liquor from the inner portions, it is possible to obtain a mixture from which, on addition of salt, pepsin may be precipitated in a condition in which it rises to the surface, drains, presses, and dries well when powdered, whilst it will prove of very good quality and digestive strength.

When it has been ascertained how much of the one liquor is to be added to the other, the mixture is made in a clean 70-gallon cask, filled to about five-sixths, and then the salt is added. It is best to add more salt than the liquor will dissolve, usually enough to nearly fill the cask to the top. The salt has to be added quickly and at once, and the stirring has to be kept up just long enough to dissolve the salt; as soon as the pepsin begins to rise in thick flakes, the stirring is to be discontinued, and the precipitate allowed to collect at the surface. The larger the flakes the better, and the more convenient for straining, pressing, etc. Unnecessary stirring will only break them into fine particles, and make the subsequent treatment of the precipitate difficult. When the pepsin begins to rise in the desired manner, the mixture is allowed to stand undisturbed till next morning, when the pepsin is removed, and transferred to a strong straining cloth, 2½ feet square. Here it is allowed to drain for one day, and the draining assisted by occasionally passing a large spatula between the moist precipitate and the cloth. The following morning the drained mass is folded in a double cloth and well pressed. The pressure has to be increased gradually, the pressed mass being taken out of the press once or twice and crumbled up by hand, then pressed again; the drier it gets the more

the pressure may be increased. Should the mass be too salt, it may be mixed with an equal quantity of a mixture of 2 parts of water and 1 part alcohol, allowed to stand for some time, drained and pressed as before. After being pressed as dry as possible, the pepsin is taken out of the cloth, crumbled up, placed in shallow trays, and dried at a temperature of not higher than 100° F. When dry, it is coarsely powdered, treated with benzol, ether or chloroform, to remove fat, again dried, and reduced to the finest powder possible.

It sometimes happens that after taking all the precautions described the pepsin does not rise well, and most of it remains in solution. By allowing such a liquor to stand longer, or by adding a fresh portion of stomach liquor and more salt, the whole of the pepsin may be recovered in good condition. It is seldom necessary to throw a liquor away after removing the pepsin, but by allowing it to stand till it has become perfectly clear, the supernatant brine may be syphoned off, and the flocculent sediment collected.

*Scale and Crystal Pepsins.*—Besides these powdered pepsins more elegant preparations known as scale and crystal pepsins are in the market, some of these being of very good quality and strength. These preparations are made entirely from the inner coatings of the pigs' stomachs. In an operation with the inner coatings of 125 stomachs, weighing about 65 pounds, they were washed and soaked well in cold water, to remove mucus, blood and other impurities, freed from adhering fat, and then passed through a mincing machine. The minced mass was placed in a digester with 80 pounds of distilled water and 16 ounces of strong hydrochloric acid, and the whole digested at about 100° F. The mixture was stirred all the while, care being taken not to let the temperature rise above 112° F., and the digestion continued till the particles of stomach were dissolved. About six hours are requisite to effect complete solution. The pieces of minced stomach swell up at first, and form a slimy grayish-white coherent mixture. This sliminess increases till the whole is converted into a uniform transparent glairy magma. By continuing the digestion and stirring, the mass loses its homogeneity, breaks up, becomes thinner, and fine red particles separate. When this condition is attained digestion is stopped, and the solution allowed to cool and deposit; before leaving it to settle, it is advisable to add 2 ounces of chloroform, and some sulphurous acid to the mixture. It is then left to stand undisturbed overnight. The amount of

peptone increases with the length of time during which digestion is carried on, and also with an increase of temperature during the operation. Next morning any dust or film on the surface is carefully removed, and the clear yellowish green solution removed and strained; if not perfectly clear, digestion has not been perfect, the temperature having been either too high or too low, and the liquid cannot be used for scaling. When clear and successful, the above quantities should yield from 95 pounds to 100 pounds of perfectly clear liquid, of the consistence of thin syrup, and should leave about 25 pounds of sediment. The clear solution is either evaporated *in vacuo*, or placed in shallow trays, and further evaporated to about 30 pounds of syrupy fluid, at a temperature not higher than 112° F. When thus concentrated, it is again strained, spread upon glass plates, and scaled in a proper scaling room. The concentrated pepsin solution keeps tolerably well for about two days, but it is best to add about one ounce of chloroform to each gallon of fluid. An experienced scaler, with a good scaling room, can get from 5 pounds to 6 pounds of good scales from the above quantity.

The so-called crystal pepsin, or peptone pepsin, is prepared in exactly the same way as the scales, except that instead of thin scales being formed, the concentrated pepsin solution is dried in thicker sheets, like fine glue, and broken up when dry into small pieces. The words crystal and peptone, applied to this class of preparations, are both inappropriate, since they are neither crystalline nor true peptones, but rather mixtures of pepsin and syntonin, with a little peptone. The pepsin is not improved by these additions; they are, in fact, mere unavoidable impurities, without which the pepsin would be of greater strength. Hitherto it has been impossible to produce an entirely pure pepsin. The scraped stomachs contain a large amount of mucus and skin tissue, the powdered inner coatings also contain, besides traces of mucus, a large amount of skin tissue. The pepsin prepared by Scheffer's method contains salt and inert albuminous matter, while the scale and crystal pepsins contain mucus, syntonin and peptone.

*Purification of Pepsins.*—For purifying the pepsins made by precipitation with salt, or by dissolving the inner skins of the stomachs and scaling the concentrated solutions, various suggestions have been made from time to time, with a view to reduce the amount of unavoidable impurities. Sulphate of soda has been proposed as a

precipitant instead of salt, and sulphurous acid has been added during the processes of manufacture, to prevent decomposition and give the operator longer time for effecting perfect clarification of the solution, by allowing every particle of undissolved stomach and suspended mucus to deposit. The sulphurous acid destroys much of the usual animal smell always present in pepsin solutions, and yields an almost odorless product.

The sulphate of soda is added to the acidulated pepsin solution, as described in Scheffer's process, at a temperature of about 94° F., when saturated sulphurous acid is added, so as to give the mixture a faint sulphurous acid odor; it is then kept at this temperature till the pepsin separates, care being taken to have sulphurous acid always present to prevent decomposition. After the pepsin has been removed the sulphate of soda mixture is allowed to cool, when a large amount of sulphate of soda will crystallize out, and may be recovered and used again. The pepsin thus prepared is tolerably free from peptones, which remain in the sulphate of soda solution, and when drained and pressed it yields a tolerably pure and active pepsin. Any sulphate of soda present may be removed by redissolving the pressed pepsin in water acidulated with hydrochloric acid, adding sulphurous acid, and dialyzing the mixture in the usual way. Pepsin dialyzes very sparingly, while peptones, sulphate of soda, common salt, syntonin, etc., dialyze much more readily in acid solutions. When sufficient sulphate of soda has been removed, the undialyzed portion is evaporated *in vacuo*, either to dryness and powdered, or sufficiently concentrated to be scaled on glass plates. The scales of this pepsin are somewhat opaque, and have a slight bitter taste, reminding one more of sodium sulphate than of pepsin.

*Patents for Pepsin Manufacture.*—Some of the above-mentioned improvements in the manufacture of pepsin have been the subject of patents. C. Jensen took out a patent for making what he called crystal peptone pepsin. He describes more minutely, and lays particular stress upon, the production of the peptone, the impurity, than the pepsin itself. J. LeRoy Webber patented the use of sodium sulphate as a precipitant and of sulphurous acid to aid in clarifying and dialyzing the impure pepsin solution; while J. B. Russell patented the dialyzing process in general for the removal of peptones, soluble salts and other impurities. Some of the advantages claimed



by these patents are doubtful, while some of the processes were in use in one form or another long before the patents were filed.

*Characteristics of Good Pepsins.*—All good pepsins should be of a light color; the scales a light lemon, slightly greenish and nearly transparent; the powder white, or nearly so. They should be soluble in water, with a characteristic, but not offensive or putrescent smell, nor should they be very hygroscopic. Deficiency in any of these respects is usually due to faulty manufacture, or to the presence of mucus, albumin, peptone or inert animal tissue. The digestive power of good pepsin should be near 2,000 times its own weight.

*Tests for Pepsins.*—The different official tests for ascertaining the digestive strength of pepsin are perhaps sufficient to ascertain if a sample is above, below, or of, the required standard; but they do not give the actual strength. There is no recognized test which under all circumstances will give uniform, impartial results, and slight variations in the manipulation will frequently occasion widely different results with the same pepsin. It must also be borne in mind that the real digestive power of a pepsin is measured by the amount of peptone which it is able to produce in a given time, under certain conditions; while, at present, it is usual to be satisfied with ascertaining the amount of albumin dissolved. The first step in the digestive action of pepsin on coagulated albumin, is the conversion of the latter into soluble acid albumin, or syntonin; from which state it is subsequently converted into parapeptone and then into peptone proper. A weak pepsin may dissolve all the albumin and convert it simply into syntonin, but fail to carry the digestion further and may not produce peptone, whilst a much stronger pepsin may, in the same time, convert the albumin not only into syntonin, but also into peptone. So far as appearance goes, both samples would appear to have done equal work, the albumin being dissolved in both instances; while, in reality, the one is double the strength of the other. It must also be remembered that in testing a sample of pepsin, the results are materially influenced by various conditions. Pepsin, if allowed to act on more albumin than it can digest, will convert the albumin principally into syntonin and produce very little, or no peptone at all. Being undialyzable also, it cannot penetrate the albumin, and exerts its dissolving power only on the outer surface of it; it is therefore evident that the more finely divided the albumin is, the greater will be its outer surface and the more readily

will it be acted on and dissolved. Syntonin and peptone are also more soluble in weak solutions; 100 grains of albumin require about 1 ounce of acidulated water for solution; if less water is used, the solution is retarded.

The activity of different pepsins varies, and as it is difficult to estimate the undissolved portion of albumin, which after four hours of digestion is always in a more or less advanced state of digestion, it is best to regulate the amount of albumin in such a manner that after the termination of the experiment it is, as nearly as possible, completely dissolved. To effect this, one or two preliminary tests will be required before beginning the ultimate experiment. In fact, those who have from time to time to examine samples of pepsin and desire to get uniform results, will find it requisite to see that their experiments are each time carried on under precisely the same conditions, and to pay attention to the following points: The eggs used must be fresh; the time during which the eggs are boiled must be uniform, as must also the degree of fineness to which the coagulated albumin is reduced, the proportion of albumin and acidulated water used, the degree of acidity of the acidulated water, the temperature at which digestion is carried on, the time required to effect solution of the albumin, and the agitation of the mixture during digestion. It will be serviceable to take a sample of the best pepsin obtainable as a standard, and compare any pepsin under examination with it, so as to ascertain how much of any pepsin is required to produce the same results with the same amount of albumin, fluid and acid, with the same degree of heat, during the same period of digestion, and with the same amount of agitation. Fresh eggs are placed in cold water, heat applied until the water boils and the eggs kept in the boiling water for fifteen minutes. They are then taken out, plunged in cold water to cool, the coagulated white of egg then separated from the yolk, and rubbed and squeezed through a sieve of thirty meshes to the square inch. Two hundred grains of this finely divided albumin are triturated in a mortar with distilled water, containing 5 minims of strong hydrochloric acid to the ounce. When well triturated the mixture is put in a widemouth bottle and sufficient acidulated water added to make the whole measure 2 fluidounces. One-tenth of a grain of the pepsin under examination is then added, and the whole digested for four hours at a temperature of 104° F., shaking the bottle every ten minutes. The

pepsin is best mixed with four times its weight of sugar of milk, and a proportionate quantity of this mixture used. When of good quality one-tenth of a grain of pepsin will dissolve the whole of the 200 grains of albumin. It is best to make comparative experiment with a standard pepsin of great and known strength, and also with a flask containing the same amount of albumin and acidulated water, but no pepsin. Should the pepsin under examination not dissolve all the albumin, comparison with the flask containing no pepsin will show approximately how much has been dissolved, and help to indicate how much more pepsin to use in a second experiment, to dissolve all the albumin, so as to effect perfect solution.

Should it be necessary to ascertain how much peptone and how much syntonin are formed during the digestion, the mixture should be boiled, to destroy any further action of the pepsin. The solution is then filtered from any undissolved albumin, and the filtered solution, while still warm, neutralized with sodium carbonate, when syntonin will be thrown down. The difference between the syntonin and undissolved albumin, and the original amount of albumin used in the experiment, will give the amount of real peptone formed during the process of digestion.

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## SOME LOCAL INDIGENOUS PLANTS OF MEDICAL INTEREST.

BY JOSEPH CRAWFORD, PH.G.

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[See also January number, p. 42-50.]

Our next field of medicinal plants will show us those of the gamopetalous division, *i. e.*, those having the corolla or most attractive portion of the flower composed of parts almost or entirely united. The first one to greet us in our new field will be *Sambucus canadensis*, or common elder. Its bushy and symmetrical growth, large pinnate opposite leaves, handsome white flowers terminating the stems and abundant good fruit, make it quite a conspicuous object throughout the season, along many a fence row; and some authorities go so far as to say that our elder is almost a pharmacy of itself, nearly every portion having been used for some trouble or other in domestic practice. Regular practitioners restrict the use of it very materially nowadays.

Our next genus is likely to have a representative also along the fence, *Viburnum prunifolium*, or the sheep-berry of our youthful days. For those who may have forgotten it, we give you this inadequate word picture somehow as we recall it: A shrub or dwarf tree seldom over 15 feet in this latitude, very erect or strict trunk, but body of shrub is heavily branched in every direction, making an impenetrable head of twigs but of graceful outline. If you can



imagine such an arrangement of branches densely covered with leaves as a background and the large and numerous flattish collections of white flowers as the principal features of the picture, you could have some idea of the beauty and grace of the little tree in flower. Several other species are near us, however of no medicinal significance as far as we know; but, in *Triosteum perfoliatum*, or fever root, we have a plant which as a drug dates its history from the aborigines, though now fallen from general use.

In the order Rubiaceæ we have as a modest starter the little *Mitchella repens*, partridge berry, a prostrate running plant, abundant everywhere in woods, forming dense mats of large areas. Its little white twin flowers are suggestive of the trailing arbutus, to lovers of that delicate little plant, but are rather fainter in odor. The bright red berries are very prominent during the winter, nestling among the dark evergreen leaves of the plant. *Cephalanthus occidentalis*, or button bush, is an undershrub found along water-courses and reminds one of a miniature button ball or sycamore tree, principally by its flower heads.

*Galium Aparine*, Cleavers, reminds us sharply that it is not to be passed by so hurriedly by our bringing up suddenly against some of its prickles going in opposite direction. This weak, straggling plant depends entirely upon its strong prickles for an upright existence, which it seldom reaches; it is common in moist thickets.

Next we espy, in late summer especially, the largest natural order we have to deal with in systematic botany, the Compositæ, forming as it does  $\frac{1}{10}$  of all known spermatophytes or phænogamous plants, and  $\frac{1}{8}$  of North American plants. As a beginner we have the little family of Eupatoriums. In the moist portions of the field *Eupatorium perfoliatum* and its "*purpureum*" brother, Joe-Pye-weed. The first named has always been synonymous with the mere mention of *Materia Medica* about this College, and does seem a trifle bulky for the tongue, but after a little analysis of its terms the idea of the name is simplified materially, and the same holds good of the other species we have in the vicinity. *E. purpureum* is so called from the purplish stem and panicle of flowers; *E. aromaticum* from its pleasant odor; *E. hyssopifolium* has hyssop-like leaves; *E. rotundifolium* is round-leaved; *E. sessilifolium* has the leaves placed directly on stem; *E. ageratoides* is like garden ageratum. They are all handsome plants and easy of study for belonging to what is considered a very hard order.

*Liatris spicata*, blazing star, outrivals the eupatorium tribe for arrangement of growth and beauty of flowers, which, as indicated by its specific name, are in a very long spike. This is more common in Jersey than in Pennsylvania and is much sought for among nurserymen.

Out of the 40 or more species of *Solidago* in Eastern United States we have but one or two that have been used whatever in medicine; *S. odora*, the chief of these, is one of the earliest to bloom in the fall, and is recognized by its leaves giving out an agreeable odor like anise when they are bruised. The *Solidagos* are beautiful in flower and tend much toward making autumn the golden season of the year.

Everlasting, *Gnaphalium polycephalum*, is another field representative of this great order, but is used chiefly in brewing domestic troubles or ales. *Inula Helenium*, elecampane, an European species, is established here princi-



pally as an escape from gardens. *Polymnia Uvedalia*, bear's foot, is a rough-looking and coarse plant, 3-10 foot high, large leaves shaped somewhat like a bear's foot, fleur-de-lis, tongue and dart or almost anything else your fancy could picture.

This and the *P. canadensis* are uncommon in this immediate section.

With the accession of *Ambrosia artemisiæfoliæ* to our category of useful plants, we can hope to hear as much good from our friends the asters.

These are the most abundant fall plants we have, unless it be the *Solidagos*. They frequent all places, from airiest and highest mountain to sands of seashore, and until some one cares to use them they must remain weeds. But the *Ambrosia artemisiæfolia* and *A. trifida* are appearing to be of some service in this world of disease, and we trust so in order that they may retrieve their good name, for the application of the generic name from the food of the gods was decidedly inappropriate.

The cloburs, *Xanthium strumarium* and *spinosum*, are not natives, but one would suppose so from the frequency of the former along our roadways. They are not at all clannish for foreigners, but adhere to the material or neighbor next to them.

*Rudbeckia laciniata*, cone flower, is a tall annual plant found along streams and marshy places and claims little merit either for beauty of growth or wealth of constituents. The sunflower, *Helianthus annuus*, is too well known to describe. Swampy regions send us a disagreeable fellow to part with after passing through his locality, *Bidens bipinnata*, or Spanish needles, also too common to mention further. The following foreign plants, now appearing here plentifully, may be noted as possessing medical virtues: *Anthemis nobilis*, or Roman chamomile; *Chrysanthemum Leucanthemum*, ox-eye daisy of the fields and street side, for the florists have found it valuable in their line; *Chrysanthemum Parthenium*, or feverfew; *Tanacetum vulgare* from the roadsides; *Tussilago Farfara*, or coltsfoot, from ballast grounds; *Arctium Lappa*, or burdock and its varieties; *Cichorium Intybus*, or chicory; *Taraxacum officinale*, our common dandelion; *Artemisia vulgaris*, or mugwort; *A. Absinthium*, *A. Abrotanum*, old man or old woman as the case may be; *Senecio aureus*, or golden ragwort, is a common plant about here in spring and is rendered quite attractive by its bright golden flowers.

*Erechtites hieracifolia*, fireweed, is a very common plant about dwellings, and especially so in clearings, and is likely to play an important part in *Materia Medica* of the future; it would be pleasing to see this labelled "A useful Weed."

*Erigeron canadense* yields an oil that is officinal, but the whole plant was used by the aborigines and found beneficial. Two other species are common with us, *E. annuus* and *E. Philadelphicus*. *Achillea Millefolium*, yarrow, is another plant very common, but of great service in domestic arts. Lion's foot, *Prenanthes Serpentina*, is abundant in woods, and also commonly called rattlesnake root, it being reputed as an antidote for rattlesnake bite. On this subject a gentleman having searched the domestic literature of medicinal plants wonders how the bite ever had a chance to prove fatal, judging by remedies recommended as cures. We would suggest 'tis only when whiskey, that extremely subtle fluid Jersey lightning, is absent.

*Lactuca canadensis* is a common plant to all situations, and noteworthy as

a possible source of lactucarium ; another species yielding it is the European *L. Scariola*, which is fast becoming naturalized by aid of railroad ballasting.

We have given a brief résumé of this large and important order, and trust you will not feel offended if any of your friends in the sunflower family have not received special mention ; but we would recommend as a palliative to any possible injury, a railroad ride across New Jersey, notably along the Delaware shore, where in the proper season, autumn, the Compositæ are in their golden glory.

Nowhere, as yet, in all our travels, have we met with such a magnificence of bloom, in this order, as there is represented along this route. You literally travel through acres of golden yellow flowers, limited only by woods or cultivated fields on the one side and the terminals of the road in length.

The Lobeliaceæ are represented in most places by two fine plants ; one whose cardinal virtue at present is its color, *Lobelia cardinalis* or cardinal flower, and *L. syphilitica*, which resembles the former very much, except that the flowers are blue and arranged in a thicker spike. The cardinal is the most conspicuous of our lobelias ; its long red spikes of bloom are as near the cardinal color as has yet been found in nature. The two mentioned, with *L. puberula*, are the largest species we have, ranging from 2 to 3 feet in height ; but it is reserved for a smaller and less conspicuous one to keep up the business end of the family ; or, in fact, to bring up before the world all disagreeable material in a business-like manner. *Lobelia inflata*, or Indian tobacco, is very common in fields, easily recognized and not likely to be confounded with other plants.

Of Ericaceæ, the trailing arbutus, *Epigæa repens*, is common to both States, New Jersey and Pennsylvania. Who of us has a soul so cold or a scent so small that he can say he finds no beauty in this modest little forester ? *Gaultheria procumbens*, or teaberry, claims a little supremacy in size over the arbutus, being an erect plant, 3-5 inches high, and more abundant in New Jersey than here. *Oxydendron arboreum*, sour wood, has been suggested for the list of new remedies. Near here the only known specimen tree, for such it is, is in Bartram's Garden, but the Alleghenies are a home for it.

The so-called laurels, *Kalmia latifolia* and *K. angustifolia*, we have in profusion ; they form beautiful objects during their blooming season, and by reason of their growth excellent coverts for game, but are most annoying to the pedestrian seeking to get through them. Pipsissewa, *Chimaphila umbellata*, and its brother, *C. maculata*, are abundant in nearly all woods. *Monotropa uniflora* deserves mention as a remedy and also as a curious plant growth. It is a parasite, small, leafless, with a simple stem, 3-8 inches high, and a large nodding flower terminating the stem. The whole plant is waxy white, and remains so until the production of seed begins, when it changes to black and soon becomes entirely changed in color ; it grows in clusters in woods, and is apt to be mistaken for a fungus by those not instructed. The term ice plant has been applied to it, also nest plant, or bird's nest, ova ova, fit root, Indian pipe or pipe plant, as it resembles a pipe, and also corpse plant, from its lividness.

The species *M. Hypopytis* is taller, pubescent, dull yellowish-brown, has numerous flowers, and the whole plant is pleasantly scented, which odor does not diminish by drying.

The Primrose Family sends us the poor man's weather glass from Europe to

aid us in our curative processes; *Anagallis arvensis* is a small annual now scattered in our fields. The common name is derived from its act of shutting up shop on approach of rainy weather.

*Fraxinus Americanus* is a most abundant ash, as you meet it frequently along fences or in rather open woods, and recognized at a glance by its peculiarly shaped fruit. Another member of the order Oleaceæ in this latitude is the Fringe Tree, or *Chionanthus Virginica*. It is of great beauty during flowering season, made conspicuous by its long and drooping panicles of delicate white flowers. For this reason it is highly prized by horticulturists. *Ligustrum vulgare*, or privet, belongs to this order, and has adapted itself to our country.

*Apocynum androsæmifolium* and *A. cannabinum*, dogbaue and Canadian hemp respectively, appear in moist meadows and deserted fields quite abundantly. A chief characteristic of them is the fruit arranged in pairs of slender follicles, 3 or 4 in. long.

The order Asclepiadaceæ, which is closely connected to the preceding, yields the butterfly weed, *Asclepias tuberosa*, or pleurisy root, common in sterile soils, particularly in New Jersey, the lower portion of which is pretty well covered with it. The rich orange of its flowers makes it a very conspicuous plant, quite attractive and valuable for lawn decorations. Dr. Barton said of this plant "that it was one of the most important of our indigenous remedies." The common milkweed, *Asclepias Cornuti*, is a larger plant, more robust, with flesh-colored or whitish flowers, and very common in waste places. A few weeks ago a specimen root was sent us by an importing house, as a sample of elecampane. It was utterly unlike inula, but the characters were so few that identification was accordingly difficult, and before arriving at a determination word was received from the collectors that it was not Inula at all but milkweed, *Asclepias Cornuti*, and pulled too soon. Needless to say we reached the same conclusion respecting their education in some things essential. The whole order is of great interest to the botanical student, however, as furnishing fine examples of cross-fertilization, and for the benefit of the student we will mention the other species found in nearby localities as it is likely they are as important therapeutically as the species mentioned above: *Asclepias pauperula*, at Cape May; *A. rubra*, scattered in New Jersey; *A. purpurascens*, also remotely in the state; *A. incarnata* is very tame, encroaching, in moist situations, to our very doors, and its variety *pulchra* is filling up some of the swamps of adjoining state to the East, while its neighbor, *A. obtusifolia*, occupies the very dry portion; *A. variegata*, *A. phytolaccoides*, *A. quadrifolia*, and *A. verticillata* are all beautiful plants more or less common to our own state. Thus we have 11 species known to Eastern United States at our doors.

*Spigelia Marilandica* in the order Loganiaceæ is reported from southern portion of New Jersey, but we have never met with it. But the Gentianaceæ are represented by handsome Sabbatias and Gentians that to a mild degree replace the required ones of the stores. *Sabbatia lanceolata*, *S. angularis*, *S. stellaris* and *S. gracilis* are the ones most frequently met with and are magnificent specimens of that genus, the two last being found in brackish marshes along the Jersey coast and noticeable among the sedges at once by their star-shaped pink flowers.

Among the Gentians the *G. angustifolia*, of pine barrens, is the largest



flowering and smallest plant of the genus we have here and its deep blue beauty is only approached by *G. crinita* or fringed gentian, which is found in remote situations in both states. *G. Andrewsii*, or closed gentian, is not only a beautiful plant but one very trying to the patience of the novice in botany when he undertakes to await the opening of the flower for purpose of analysis. As he is about abandoning the idea, a bee comes along and enters the flower without any hesitation whatever, proving that it has been open for days and only for such meddlers as belong to the bee tribe. To others it is quite exclusive.

*Polemonium reptans*, order Polemoniaceæ, is found within the city limits abundantly near watercourses, a very graceful plant of low growth and handsome light blue flowers in early spring. *Hydrophyllum Virginicum*, order Hydrophyllaceæ, is found in company with above and is noted as a remedial agent.

The order Boraginaceæ has no native representatives of importance in Materia Medica. Though we have good authority that the Indians made use of several genera to aid them in relieving distress, notably, lungwort, *Mertensia virginica*, and puccoon, *Lithospermum canescens*. We have the introduced species *Symphytum officinale*, comfrey, and *Cynoglossum officinale* or hound's tongue, chiefly found about gardens and roadsides. An order for hound's tongue caused some confusion in this city some months ago; rib grass, *Plantago lanceolata*, had been sent under label of hound's tongue and the party persisted that they were right, but would give no authority, while we had for ours any manual of plants published in this country. *Cynoglossum* was the desired article, and the consumer wanted it in green condition; we sent him the plant.

*Ipomœa pandurata*, man-of-the-earth, order Convolvulaceæ, is a common native and a troublesome weed to many farmers by its extensive running vines and its monstrous root stocks, which often weigh upwards of 20 pounds. As it has been put upon our list for medicinal purposes, why should it lack investigation when so much material is at hand?

From the order Solanaceæ, we have *Solanum Dulcamara* in many places and *Solanum Carolinense*, a rough species, prickly in fact, found in sandy and waste places. *Hyoscyamus niger* has been found in this country on ballast grounds only. *Datura Stramonium*, or jimson weed, is another foreigner of great value to us in Materia Medica and found without much trouble even here in the City Parks (!).

In the order Scrophulariaceæ we have two genera represented by European plants that have become weeds here now, *Verbascum Thapsus*, or mullein, a familiar family medicine, and *Linaria vulgaris*, or toadflax, which is restricted to certain schools of medicine. The toadflax is a beautiful plant and flower, and would rank well among our ornamental plants, for which purpose it was sent many years ago to this city, but listen to what John Bartram says of it in Troublesome Plants: "The most mischievous of these is the stinking yellow *Linaria*. It is the most hurtful plant to our pastures that can grow in our northern climate. Neither the spade, plough nor hoe can eradicate it when it is spread in pasture, . . . and the cattle can't abide it." This redeeming feature it has though, as a fine illustration for study of morphology.

Figwort, *Scrophularia nodosa*, Gray's variety *Marilandica*, is a rank plant, 4 or 5 feet high, growing in moist, shady places, very common in this state; also interesting in morphology. *Chelone glabra* is another scrophulariacea found



in wet places, and its large white flowers are very suggestive of the common name, turtle head. The old *Leptandra*, now again called *Veronica Virginica*, is not well distributed but abundant in its localities; it bears little resemblance to true veronicas, being very tall, leaves arranged in whorls and many spikes of flowers furnished with long stamens enclosed by a short, tubular corolla, while veronicas proper have usually small, short stamens, and spreading corolla. *V. officinalis* is about the only other native of which we have any preparation. In this order we have several genera that have been proven parasitic by roots, and in this connection *Gerardia*, *Buchnera*, *Schwalbea* and *Castilleja*, are worthy of closer investigation.

Among the parasitic orobanchaceæ the beechdrops or cancer root (*Epiphegus Virginiana*) is suggestive of real worth, with little substantiation, but as a root parasite it is a success. Three other genera are found in these limits, of which two are native, namely: *Conopholis*, on roots of trees forming large masses of flowering stems, and *Aphyllon*, also on trees, but with only one or two single flowered stems. The introduced one is *Orobanche*, found principally on clover roots or fields, though we have found one growing on the roots of common house geranium.

Of the order Bignoniaceæ, *Catalpa bignonioides* is used to a limited extent in medicine, but is more valuable as an ornamental tree.

*Verbena hastata* and *V. urticæfolia*, of the order Verbenaceæ, are noticeable as having some medicinal virtues and also as frequent wayside weeds of little notice except for the deep blue flowers of the first species. The leaves are usually covered with a whitish substance that renders them interesting to the student of lower forms of vegetation, but unsightly to casual observers of nature.

The order Labiata ranks well in number of genera and species with other large orders, while for odor it stands among the first.

The first we call your attention to are pepper- and spear-mint, *Mentha piperita* and *M. viridis*. They are common along water-courses, and easily distinguished after a little comparison. *Collinsonia canadensis*, or horse balm, is a large coarse plant, with peculiar yellow flowers in a very loose panicle, which serves to diffuse the odor which some people claim to be lemon-like. *Lycopus virginicus*, bugle weed, is abundant along ditches, unattractive, and has an odor peculiar to water plants. *Cunila mariana*, or dittany, is a favorite herb among the country folks, for all sorts of teas. It is truly a dry woods plant, and its neatly arranged purplish blossoms are very attractive to all people. The odor is pleasantly camphoraceous.

*Origanum vulgare* and *Melissa officinalis* are found in scattered locations. For *Hedeoma pulegioides*, or pennyroyal, we must hunt in the dry fields, and even then look closely to keep out its counterpart, *Isanthus cæruleus*, which it closely resembles except in the degree of odor.

The monardas were undoubtedly called horse mints on account of their "strong" odor, which, however, is not disagreeable in any of the species, but just intense.

*M. punctata* is fondest of Jersey sands, and it is a relief for the eye to meet a clump of this in bloom. *Nepeta Cataria*, catnip, and *N. Glechoma*, ground ivy, are not native, but are abundant and useful. The same may be said of horehound, *Marrubium vulgare* and of *Leonurus cardiaca*, motherwort, the useful-

ness of horehound certainly not being questioned. To this order also belongs a plant nearly forgotten, that only some years ago enjoyed quite an empirical distinction, as mad dog skull cap, *Scutellaria lateriflora*; whether or not it has outlived its usefulness for the mad dog, we know not, but dogs seem better bred now than formerly, with less to excite their ire.

*Plantago major*, the large leaf or common plantain, and its twin brother, *P. Rugelii*, also *P. lanceolata* or rib grass, belong to the order Plantaginaceæ. The first two species are closely related, but the lance leaf is easily recognized. This species is the one that figured as a substitute for hound's tongue and lately we have samples from an importing house of cumin seeds which proved to be from this species of plantain, but we have never heard any explanation made for the substitution.

The chenopodiums are very disagreeable to handle. The medicinal ones are introduced species and our natives are seldom applied; but in *Phytolacca decandra* we have the solitary species of the only genus of its order in this section. A robust plant, fond of clearings, the young shoots are excellent in spring as a substitute for asparagus; later in season the roots are large enough for all remedial purposes to which they may be applied. Their use has been sanctioned by most schools of medicine.

Yellow dock, *Rumex crispus*, order Polygonaceæ, and bitter dock, *R. obtusifolius*, are not native to the country, but are used very frequently and are found in most sections throughout the country. From the genus Polygonum we have *P. acre*, *P. aviculare* and *P. hydropiper* or smartweed, claiming properties worthy of consideration.

With the order Aristolochiaceæ we introduce two plants which are very interesting as well as curious: *Asarum Canadense*, or wild ginger, and *Aristolochia Serpentaria* or Virginia snake root. The former is found abundantly in this neighborhood in springtime and its large brownish-red or reddish-brown flowers are seldom seen above ground but just hidden under fallen leaves. The leaves are large, glossy, and resemble a colt's foot in outlines. *Serpentaria* prefers woodlands and is seldom in profusion. Its place in *Materia Medica* is now usurped nearly entirely by *A. reticulata* from the S. W. States. *Aristolochia clematitis* is an European species found in Bartram's Garden, most likely sent here by one of the correspondents of Bartram.

*Sassafras officinale* and *Lindera Benzoin*, or spice bush, are well-known forms of order Lauraceæ. Surely should we turn back a few day pages in our life book we would find the odor of the *Sassafras* and spice bush as agreeable now as in the days of our youth.

*Phoradendron flavescens* in the order Loranthaceæ is a parasite, our mistletoe, growing in this locality upon blue gum trees in New Jersey. It has no connection with the soil but derives its sustenance from the branches of trees. It has little narrow leaves, small flowers and waxy-looking fruit that is very attractive for decoration during the holiday season.

The genus *Euphorbia*, in that valuable order Euphorbiaceæ, has many species that are abundant here, though few of them receive any special notice.

*Euphorbia hypericifolia* is an inconspicuous plant, nearly a weed in fields. *E. Ipecacuanhæ* is a native of New Jersey and is very common in the sandy section of that state; when in bloom, the little nearly prostrate plants resemble bright red and other shades of coral. The root, however, is seldom obtained

in its entirety; it is very large, numerous and long, and seems to extend in almost a perpendicular manner towards the earth's centre, as they never return nor twist in any other direction.

In the order Urticaceæ we have commonly around us by river sides, the *Celtis occidentalis* or hackberry, and *Ulmus fulva* or slippery elm, both trees of medium size. The latter is pretty quickly noticed by boys. The former resembles it in general appearance, but has a characteristic rough bark that cannot be mistaken. We have also on our waste places a good American representative of the foreign hemp, and we call it *Cannabis sativa*, variety *Americana*. It resembles the species, though we think the seeds of our plant are larger and the markings darker and larger. The numerous digitate leaves, slightly drooping, give a very graceful appearance to the tall plant. *Humulus Lupulus*, the hop, is supposed to be growing native along the lower Susquehanna. *Urtica dioica*, the nettle, always gives an unpleasant welcome or rather rebukes smartly the passerby, hence we will let them remain as they grew, in neglected places.

Another tree order is that of Juglandaceæ, and the principals are *Juglans cinerea* of Linné, and *J. cathartica* of Micheaux, the butternut or white walnut, which yields an active drug for us, and *Carya alba* or shell-bark hickory one for the Hahnemann School. The butternut resembles the black walnut, but its bark is smoother and with leaves lighter green and fruit very clammy instead of smooth and oblong against the round ones of the nigra.

The shell-bark hickory is well known to boys and who don't forget it when they become men.

*Myrica cerifera*, wax myrtle, and *Comptonia asplenifolia* are shrubby plants of the order Myricaceæ, very strongly aromatic of leaves and fruit, the *comptonia* very pleasantly so; hence its common name, "sweet fern." The wax myrtle has its fruit covered with a wax-like incrustation. Both plants are abundant, particularly in New Jersey.

*Betula lenta* or sweet birch is another of the hillside friends of our youth; by that, we mean, by way of explanation, the appreciation of its spicy bark, and not the application of its virgate bunches to the back; but, we know full well all about birch oil.

*Alnus serrulata*, swamp alder, and *Fagus ferruginea*, the beech, are also useful in medicine to some extent and also very common. The oaks are as noble as ever and as useful. *Quercus alba*, white oak, *Q. rubra*, red oak, and *Q. tinctoria* of Bartram, furnish us with all the oak bark we can use; they are also some of our grandest specimens of forest trees. Cowper says: "Lord of the woods, the long surviving oak."

*Castanea vesca* var. *Americana* is the well-known chestnut tree. This, unlike the oak, prefers colonies of its own to appearing by itself in remote places.

Our next and last order for the present is Salicaceæ, consisting of two genera, *Salix* and *Populus*, the latter furnishing us balm of Gilead buds from *Populus balsamifera*, and the former salicin, from almost any willow you may use.



## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, February 21, 1893.

On motion of Dr. Lowe Mr. Wm. McIntyre was called to preside, and the reading of the minutes of the last meeting was dispensed with.

Prof. Sadtler spoke of the chemical interest involved in *sodium peroxide*. Chlorine bleaching has been for a long time regarded as the most efficient of all processes for this purpose; but its disadvantages are that in animal and vegetable fibre the texture is much injured; the same objection applies to sulphur dioxide as the acid generated is deposited in the fibre and destroys it. *Barium peroxide* and *hydrogen peroxide*, both possess the advantage of yielding nascent oxygen, which destroys the color and leaves water only as its residuum. *Sodium peroxide* was prepared as long ago as 1815 by Gay Lussac, but its practical use has been brought about by H. Carrington Bolton, an American chemist. This has been rendered possible by the reduction of the price of metallic sodium. It is a yellowish-white granular powder, very hygroscopic, and gives twenty per cent. available oxygen. There are two ways of using it, either in making peroxide of hydrogen or peroxide of magnesium, and this latter substance is quite stable and devoid of injurious action on fibres either of silk or wool. The decomposition of twelve ounces of sodium peroxide with a quantity of weak acid produces a preparation equal in efficiency to one gallon of ten per cent. hydrogen peroxide. It is necessary that the solution be made in vats of wood, glass or earthenware, as metallic containers exert a baneful influence on the mixture. It can be used as a bleacher of tussa silk, a cheap kind of silk fibre, and consequently a troublesome one to work; in dentistry it has been found useful in bleaching discolored dentin.

G. M. Beringer, Ph.G., read a paper by Mr. Jos. Crawford, on some local medicinal plants, in continuation of the one read in December last, and the paper was illustrated by a large number of beautifully prepared specimens of the plants described.

Mr. F. W. Meink, a member of the present senior class, read a paper upon *Dioscorea Batatas* or Chinese potato; the investigation was made at the suggestion of Professor Maisch.

An inquiry was made as to the uses of *Cynoglossum officinale*. The reply was that it was used by a pharmacist as a hair restorer, but that several months use showed no advantage.

Prof. Trimble exhibited a very beautiful sample of *milk sugar*. It was the product of some of the Chester County creameries consuming from 25,000 to 45,000 pounds of milk per diem. Parties have been trying for years to make sugar of milk, but had failed; when the chemists who had been employed at the Spreckels sugar refinery ceased their connection with that concern, they began experimenting with milk sugar and the best methods of decolorization. The manufacturers expect to make a ton to a ton and a half per day—the largest consumers of milk sugar are those who make infant foods, and next to them are the homœopathic pharmacists. The Fairmount Creamery is the company operating this manufacture, and is the largest in this part of the state. The milk sugar will be in the hands of Messrs. Warrington & Pennypacker, of this city.



Dr. Lowe made some remarks upon an *imitation coffee*, composed of coffee, clay and bean fecula, made into the form of coffee beans. Mr. Perot said that he had seen the process and that the ingredients consisted largely of chicory, molasses and flour; some of the stuff was said to contain one-third coffee.

On motion the papers were referred to the publication committee, and the meeting then adjourned.

T. S. WIEGAND, *Registrar*.

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## EDITORIAL.

*The formal opening of the new buildings* of the Philadelphia College of Pharmacy took place on the evening of February 22, in the museum hall, which for the occasion was tastefully decorated with plants, flowers, flags and bunting. The large hall was well filled with an audience of members, graduates and friends of the College, and of representatives of sister institutions, and the enjoyment of the occasion was enhanced by choice orchestral music. After prayer had been offered by the Rev. Geo. Rees, pastor of the Baptist Tabernacle Church, the chairman of the Building Committee, Howard B. French, made a short address of welcome, and then introduced the orator of the evening, Professor Remington, whose address, historical as well as descriptive, will be found in the present number, and the descriptive portion of which will be further explained by reference to the illustrations of the College buildings, accompanying this number.

Dr. Horatio C. Wood, professor of materia medica and therapeutics in the University of Pennsylvania, made an address in which he spoke of the importance of materia medica as a branch of both medical and pharmaceutical education, dwelling also upon the relation of the pharmacist to the physician. The concluding address was made by Mr. J. H. Redsecker, of Lebanon, Pa., who referred to the progress made by pharmacy and in the education of the young pharmacist.

Mr. French, as chairman of the Building Committee, then formally turned over the new buildings to the president of the College, Charles Bullock, who in accepting them on behalf of the institution referred in terms of high praise to the labor performed and the great services rendered by the chairman of the Committee. The latter was about to close the exercises when Jas. T. Shinn stepped forward, and as a member of the building committee claimed the attention of the audience for a short time, while he again alluded to the indefatigable services rendered by the chairman, presenting him at the conclusion of his remarks with a solid silver loving cup and plate, bearing the following inscription:

February 22, 1893.

Presented to

Howard B. French

by his fellow-members of the

Philadelphia College of Pharmacy

as a token of their appreciation of his

zeal and devotion as Chairman of

the Committee in charge of the erection

of the new buildings in the year

1892.

Mr. French was completely taken by surprise at this turn of the exercises, which, after having expressed his thanks, were then closed, to afford the audience the opportunity of inspecting the buildings, all parts of which were thrown open and made accessible to the visitors. Among the displays arranged in the different halls should be mentioned the microscopic exhibition made by the students of the microscopical laboratory, under the supervision of the director, G. M. Beringer. Signal service was rendered during the entire evening by members of the Zeta Phi Society, who acted as ushers, and as guides to the visitors through the buildings.

*The amendment to the Pennsylvania Pharmacy Law*, referred to in our last number, p. 105, has finally passed the House of Representatives, February 14, by a vote of 152 yeas to 16 nays. On February 16, it reached second reading in the Senate and passed that ordeal successfully. From information received since then there appears to be no question now about its final passage.

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## OBITUARY.

*Frederic Augustus Genth* died in Philadelphia, February 3, at the age of 73 years. He was born in the town of Waechtersbach, Germany, in 1820, received his classical education in Hanau, and subsequently studied chemistry, mineralogy and geology at the universities of Heidelberg, Marburg and Giesen, in the last two institutions working in the laboratories of Bunsen and Liebig. While at Marburg he was for several years assistant to Bunsen, and after receiving the degree of doctor of philosophy he located at the same institution as private lecturer. He came to the United States in 1847, and soon afterward located in Philadelphia as analytical chemist, acquiring a wide reputation, which caused him to be called upon as expert, in many cases involving forensic questions in mining interests, and in cases of poisoning. In 1872 he was called to the chair of chemistry and mineralogy in the University of Pennsylvania, which position he held until 1888. In 1880, Dr. Genth was elected president of the American Chemical Society, of which he was a member since its foundation in April, 1876. Together with Prof. Wolcott Gibbs, he instituted researches on the cobalt ammonium bases, the results of which were published in *Silliman's Journal*, in which also a large number of Genth's investigations in chemistry, mineralogy and geology appeared, others having been published in the *Proceedings of the American Philosophical Society*, in the *Contributions from the Laboratory of the University of Pennsylvania*, etc. During the severe cold weather near the beginning of the year, the germs of pulmonary disease rapidly developed, which terminated his useful life, as a teacher of chemistry, both private and at the University, and as an investigator in science.

*Jacob D. Wells*, a prominent pharmacist of Cincinnati, died in that city February 18, aged 57 years. He was born near Marion, O., and received his first education in the country school. At the age of fourteen he came to Cincinnati as an apprentice to the drug business. His earnings were partly invested in gaining a better education at College Hill, and in 1859 he opened business for himself, which he conducted in the same vicinity until the time of his death. Mr. Wells took great interest in the advancement of pharmacy, and was a member and for some time president of the Cincinnati College of Pharmacy, and member of the Ohio and of the American Pharmaceutical Associations, of the latter also one of its vice-presidents. As a man of sterling integrity he was called to various public offices, and while chairman of the finance committee of Councils he was known as the watch-dog of the city treasury. Since the death of his wife, a few months after the Cincinnati meeting of the National Association in 1887, his health has been on the wane, and since May last he was a sufferer of chronic bronchitis. Two sons and two daughters survive him.

# THE AMERICAN JOURNAL OF PHARMACY.

APRIL, 1893.

## CANAIGRE TANNIN.

BY HENRY TRIMBLE and JOSIAH C. PEACOCK.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 122.

Read at the Pharmaceutical Meeting held March 21.

About four years ago, a paper by one of us in this journal (1889, p. 395) gave some account of the possibilities of canaigre becoming a valuable source of tannin. Lack of material prevented the further investigation of the tannin, until last year when a liberal supply was received from Mr. Charles B. Allaire, of Peoria, Illinois, who, as President of the Tanning Extract Company, of Deeming, New Mexico, was able to furnish samples of the roots of different ages.

It may be recalled that this canaigre is the tuberous root of *Rumex hymenosepalus*, a plant growing abundantly in the sandy soil of Texas, New Mexico and Arizona.

The roots vary much in size and appearance, according to whether they are green or dry. The accompanying illustration is from a green root, one-half natural size. It and a number of others were received September 14, 1892, from Professor C. B. Collingwood, of the University of Arizona, who furnished the following interesting information:

"It is impossible to make a satisfactory division into roots one, two and three years old from wild plants. Differences of soil, amount of water, etc., cause a wide variation in the appearance. These roots were planted in July, 1891, in our plot, which happens to be mesa soil of rather heavy gravelly loam, altogether too hard and stiff for this plant, which seems to prefer almost pure sand.



“ They received some irrigation, but did not show above ground until October. During the winter they grew steadily, but slowly. About March 1, they started into rapid growth, which continued until flower and seeding occurred in April; seeds very sparingly, but more plentifully than in native state. The percentage of tannin has been steadily increasing. The roots now show signs of sprouting, and will be gathered and replanted. The yield from this plot was about seven tons to the acre, but on account of unfitness of soil



is not a fair test. Experiments on other soils indicate that we may safely expect fifteen to twenty tons of green roots per acre.

“ The last samples analyzed, August 31, contained in green root 66 per cent. moisture at 100° C, 16.18 per cent. total extract, 11.46 per cent. tannic acid (by hide) 70.98 per cent. purity. This would show in the dry roots, which contain 8 per cent. moisture, 44.66 per cent. total extract, 31.62 per cent. tannic acid with 70.98 per cent. purity.

“ During the spring I travelled over the Territory collecting samples. The average from fourteen widely different parts showed (in



dry root) 8 per cent. moisture, 44.7 per cent. total extract, 30.5 per cent. tannic acid, 68.23 per cent. purity.

"It is of great interest to us to know that the cultivated root is at least equal to the wild, and we see no reason why the percentage of tannin should not be increased by judicious selection."<sup>1</sup>

Some of the green roots sent by Professor Collingwood have been growing indoors since last September and the growth has been satisfactory.

The chief object of this paper is to give the results of a more extended study of the tannin.

*Preparation and Purification.*—Two methods of preparation were tried, one by percolation with commercial ether, and the other by percolation with cold water. The product from the ether extraction was found to be very difficult to purify from the associated yellow coloring matter, so that water was adopted as the menstruum.

The diluted aqueous percolate was divided into two equal parts. One portion was completely precipitated with lead acetate, the other was then stirred into it, and the whole filtered, whereby a yellow filtrate was obtained. The tannin in the filtrate was removed by agitation with acetic ether. By distilling off the latter under diminished pressure, the tannin was obtained as a porous yellow residue.

The thoroughly dried and finely powdered tannin was treated with absolute ether to remove coloring and crystalline substance. The latter was obtained in acicular crystals and was almost entirely protocathechuic acid.

The treatment with absolute ether proved quite successful in removing the coloring, but it is obvious that the absorption of moisture must be guarded against or tannin will dissolve.

The ether washed tannin was dissolved in ether containing just sufficient alcohol to effect solution, the latter was filtered and then distilled to dryness in a partial vacuum when a porous yellow residue remained. This was employed in the subsequent work on the tannin. Attempts were made to get rid of the yellow coloring matter by precipitation of the tannin with lead acetate and washing

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<sup>1</sup> Since writing this paper, Bulletin No. 7 of the Arizona Agricultural Experiment Station has been received from Professor Collingwood. This pamphlet of 40 pages is devoted entirely to Canaigre, under five headings, as follows: (1) Historical Sketch; (2) Botanical Characteristics; (3) Chemical Examination; (4) Cultivation; (5) Conclusions.

the lead precipitate with both water and water containing lead acetate and decomposing the precipitate with hydrogen sulphide but several lots so treated were found to afford comparatively smaller quantities of tannin, not in any way superior to that obtained above.

It was noticed during the progress of the latter work, that if a solution of the tannin possessing a red color was precipitated by lead acetate and the unfiltered mixture thoroughly saturated with hydrogen sulphide, upon filtering, a much lighter colored filtrate was obtained, thus showing lead sulphide to be, under these conditions, a good decolorizing agent. Some of the original water percolate was saturated with sodium chloride, the precipitate collected by filtration, dissolved in commercial ether and the solution distilled to dryness under diminished pressure, a porous red-brown residue being obtained. It was only partly soluble in cold, but completely in hot, water.

The filtrate from the precipitate caused by sodium chloride was shaken with acetic ether which removed a small amount of tannin much lighter in color than that thrown out by sodium chloride. It was readily soluble in cold water.

Another portion of the original water percolate of the root was agitated with acetic ether without previously decolorizing by lead acetate. The substance removed was reddish-brown in color. This was dissolved in commercial ether and the solution so obtained distilled under reduced pressure in order to remove the acetic ether and render the substance porous. This residue was dissolved in water. The dense solution, upon standing in a cool room, separated a crop of yellow crystals. These were obtained, recrystallized from alcohol, in feathery forms composed of transparent yellow crystals which gave the reactions of protocathechuic acid.

Upon longer standing, the watery liquid deposited more crystals, square shaped and larger than above, but owing to the difficulty of completely separating adhering tannin, these were not obtained so pure as were the first. However, from general behavior, they were suspected to be chrysophanic acid, or perhaps emodin—since the latter has been found in the root.

Another portion of canaigre was percolated with petroleum ether to ascertain if the yellow coloring matter could be removed by that solvent. Besides chlorophyll, fat, and the small amount of the

yellow coloring substance removed, the crystalline principles just mentioned above were extracted.

By recrystallization, the second one was obtained sufficiently freed of fat to give the calcium hydrate and the ferric chloride tests for chrysophanic acid, which it also resembled by crystallizing in a square form.

The extraction with petroleum ether did not manifestly aid in getting a lighter colored or purer tannin.

All these tannins gave the same reactions as the one employed below.

After these several attempts at purification, the tannin from the water extract purified by means of lead acetate and acetic ether as at first described, was employed for the subsequent work.

This tannin was porous, yellow, readily soluble in water and free from sugars.

Upon saturating the alcoholic solution with ether, it was thrown out in a plastic condition.

A one per cent. solution gave the following reactions :

Ferric chloride, . . . . .	}	green ppt.
and		
Ammonium hydrate, . . .	}	brown ppt.
Ferrous sulphate, . . . . .		
Lead acetate, . . . . .		no change.
Gelatin and alum solution,		yellowish ppt.
Tartar emetic, . . . . .	}	yellow ppt.
and		
Ammonium chloride, . . .	}	clouding, becoming a flocculent ppt.
Potassium bichromate, . .		
Fehling's solution, . . . .		greenish-brown ppt., darkening.
Ammoniacal silver nitrate,		reduced.
Calcium hydrate, . . . . .		reduced.
Bromine water, . . . . .		light pink ppt., turning red and brown.
Ammonium molybdate, . .		first yellow, then brown ppt.
Cobalt acetate, . . . . .		no change in color.
Uranium acetate, . . . . .	}	yellow ppt.
Ammoniacal picric acid, .	}	crimson color, upon standing, a red-brown ppt.
Ferric acetate, . . . . .		
Copper sulphate, . . . . .	}	no change in color.
and		
Ammonium hydrate, . . .	}	green ppt.
		no change.
Ammonium hydrate, . . .		brown ppt., liquid brownish-green.

A portion of the solution used above gave with bromine water a yellowish precipitate, which, upon collecting and washing with

water, became red. The washings did not precipitate silver nitrate. The filtrate was warmed to remove the slight excess of bromine. The absence of the latter in a free state having been proven by agitating with chloroform, chlorine water was then carefully added and upon agitating again with chloroform, the latter was colored red showing bromine compounds to be present in the liquid. The latter was precipitated by silver nitrate, which would indicate hydrobromic acid.

The washed and reddened precipitate was fused with sodium carbonate which rendered the bromine capable of detection by silver nitrate and by chlorine and chloroform.

The tannin was then subjected to the following examinations :

*Action of Heat.*—0.5 gram of the tannin were heated with a few cubic centimetres of glycerin at 160° C. for twenty minutes and then raised to 190° C. for a few minutes, at which temperature considerable effervescence occurred. The mixture upon cooling was shaken with several portions of ether, sp. gr. .725, which upon being separated and evaporated yielded a residue of small square yellow crystals. But for a small amount of resinous substance soluble in alcohol, the crystals were completely soluble in water and gave the following characteristic reactions of catechol :

Calcium hydrate, . . . .	{ red color, turning brown and gradually precipitating.
Ferric chloride, . . . .	brownish-green color.
Ferric acetate, . . . .	brownish-green ppt.
Ferrous sulphate, . . . .	{ no change, upon standing a slight blue ppt., the liquid remaining colorless.

*Action of Acids (Hydrolysis).*—Two grams were boiled with two per cent. (absolute gas) hydrochloric acid for three hours, during which an amorphous, red, insoluble substance separated.

The contents of the vessel were allowed to cool, then filtered, the insoluble red substance washed with water and dried over sulphuric acid. The red filtrate was evaporated to dryness on a water-bath and the residue treated with water, which it slightly colored.

The insoluble red substance was filtered off, the filtrate shaken with several portions of ether, sp. gr. .725, which removed a colorless crystalline substance, the ether removed from the aqueous liquid by warming, the latter cooled and precipitated by basic lead acetate, filtered, excess of lead removed from filtrate by means of



hydrogen sulphide, lead sulphide separated by filtration, excess of gas boiled out of filtrate, the last made alkaline with sodium hydrate, and heated on a water-bath with Fehling's solution when some reduction occurred. The amount of cuprous oxide obtained was less than that obtained from the .3 gram used, when the tannin extracted by commercial ether was acted on with the same strength hydrochloric acid.

The evaporation to dryness made the red compound more insoluble in water, or, by removing the hydrochloric acid, entirely excluded it from solution. As the red substance was found to reduce Fehling's solution, it would appear probable that it caused the slight reduction observed.

*Red Substance Produced by Action of Acids.*—This was washed thoroughly with absolute ether to remove crystalline substances. In mass it was almost black; in powder, red-brown.

It was partly soluble in ammonium hydrate, sodium hydrate, sodium carbonate, and more than one-half was soluble in alcohol. The part soluble in alcohol behaved like the tannin toward ferric chloride. This was also the portion soluble in alkalies. Heated with Fehling's solution, the latter was reduced. Cold concentrated nitric acid completely oxidized the portion soluble in alcohol; hot nitric acid, the portion insoluble in that liquid. Upon standing in contact with water for twenty-four hours, it dissolved only to an extent sufficient to color the water reddish yellow; the residue remaining, as before, not completely soluble in alcohol.

The part insoluble in alcohol dissolved sparingly in alkalies, but only upon long standing.

*Crystalline Substance Produced by Action of Acids.*—The colorless crystalline substance, removed by ether previous to treatment with Fehling's solution, gave the following reactions for protocathechuic acid :

Ferric chloride, . . . . .	}	green color.
and		
Sodium carbonate, . . . . .	}	red color.
Ferrous sulphate, . . . . .		
Fehling's solution, . . . . .		in neutral solution, violet color.
Ammoniacal silver nitrate,		no change.
Basic lead acetate, . . . . .		reduced.
Neutral lead acetate, . . . . .		white ppt.
	{	white ppt., filtrate not precipitated by basic lead acetate (absence of phloro- glucin).

*Action of Fused Alkali.*—One gram was gradually added with constant stirring to potassium hydrate in the fused state. Effervescence occurred and an odor resembling that produced in making soap from rancid fat was noticed (fusing alkali alone did not give this odor). The fusion was allowed to become cold and solid, when it was treated with water which produced a clear and perfect solution. The alkali was supersaturated with dilute sulphuric acid, the slight excess of which was neutralized with acid sodium carbonate and the unfiltered mixture shaken with ether, sp. gr. .725, which upon evaporation left a yellow residue which was destitute of sweet taste (absence of phloroglucin), almost completely soluble in hot water, the remainder dissolved in alcohol. The pale yellow water solution reacted as follows :

Ferric chloride, . . . . .	{ dark green color, changed to deep red upon adding excess of sodium carbonate.
Ferrous sulphate, . . . . .	in a neutral solution, violet color.
Ammoniacal silver nitrate,	reduced.
Basic lead acetate, . . . . .	brownish ppt.
Neutral lead acetate, . . . . .	{ brownish ppt., the filtrate was further precipitated by basic lead acetate.
Fehling's solution, . . . . .	no change (absence of phloroglucin).

Pine wood, saturated with the solution, dried and moistened with hydrochloric acid, turned yellowish (phloroglucin produces violet or red color). The above reactions indicate protocatechuic acid.

*Acetyl Derivative.*—0.5 gram of the tannin were boiled with a few cubic centimetres of acetic anhydride for an hour. The solution was poured into a relatively large bulk of water when the greater part of the derivative coalesced to form a plastic semi-solid, the remainder separating in an indistinctly granular form. The plastic portion was kneaded under the water and the granular portion washed by stirring. After standing over night, the coalescence had become a yellow solid.

The product was collected, dried over sulphuric acid, powdered, washed well with water and again dried over sulphuric acid. The drying was completed at from 75° to 80° C., above this temperature decomposition occurred as was shown by the acetous odor exhaled. Determinations of the melting point were undertaken, but it was noticed that considerable variation existed.

A larger quantity of the derivative was heated in a test tube on

a water-bath. At about 95° C., the substance fused, decomposition taking place, in which acetic anhydride was liberated, and at 100° C. the substance became a transparent, friable, solid mass.

Another portion of the derivative was boiled with water, which also caused acetous odor to be given off, but nothing was dissolved by the water which would give color with ferric acetate. Under the influence of the boiling water, the substance assumed a plastic condition, and, as would be expected, upon becoming cold, it became a brittle, opaque mass. Both residues fused above 100° C. and below 120° C. The former seemed to contain more acetic acid than the latter.

The tannin was submitted to combustion with the following results:

(I)	·1629	gram	tannin	gave	·3488	gm.	CO <sub>2</sub>	and	·0792	gm.	H <sub>2</sub> O.
(II)	·1376	"	"	"	·2912	"	"	"	·0652	"	"
(III)	·1815	"	"	"	·3875	"	"	"	·0872	"	"
					I.		II,		III.		Average..
C,	·	·	·	·	58·39		57·71		58·22		58·10
H,	·	·	·	·	5·40		5·26		5·33		5·33
O,	·	·	·	·	36·21		37·03		36·45		36·57

The result of these combustions indicates that canaigre tannin belongs to a group, of which the tannins from mangrove and rhatany are typical representatives.

## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*Adulterated litharge*, containing ten per cent. of matter insoluble in acetic acid, is reported by Dr. A. Schneegans; the adulterant was proven to be fine white sand colored with a little ferric oxide.—*Journ. Phar. Els.-Lothr.*, 1893, 41.

*Santonin reactions.*—(1) The color reaction with sulphuric acid and solution of ferric chloride, if applied as follows, will uniformly give the same result: In a test tube, dissolve the santonin in sulphuric acid, in another tube mix about one-half drop of solution of ferric chloride with one cc. water; upon mixing the two solutions, considerable heat is evolved, but only enough to cause a yellow color in the mixture; if the test be warmed for a few seconds by use of

a spirit lamp or Bunsen burner, a fine violet coloration appears.—Stadelmann, *Südd. Apoth. Ztg.*, 1893, 70.

(2) If santonin be heated with potassium cyanide until a fused mass results, a red color appears, changing quickly to brown-yellow; the mass dissolved in water or solution of potassa forms a brown solution showing marked green fluorescence. (3) In fusing santonin with potassium hydrate a red coloration is noticeable, becoming darker by prolonged heating; the aqueous solution of the fusion is red, but changes through brown-yellow to yellow.—J. Schermer (*Nederl. Tijdschr. v. Pharm.*) *Apotheker Ztg.*, 1893, 77.

*Theobromine estimation in cacao-beans.*—The beans with an equal weight of purified sand are finely comminuted and then six grams of the mixture extracted with petroleum ether in a continuous extraction apparatus for ten hours, to remove the fat; the residue is boiled for one-half hour with 200 cc. distilled water and 6 gm. freshly prepared pure lead hydrate, strained, expressed and filtered; the insoluble portion is twice boiled with 100 cc. distilled water and the united filtrates evaporated to 10 cc., transferred to a separating funnel and agitated for three minutes with 100 cc. chloroform. After complete separation of the chloroform, requiring about three hours, the chloroform is removed and the operation repeated three times. From the combined chloroform solutions the greater portion of the solvent is distilled off, the remaining solution transferred to a tared beaker, the flask rinsed with warm chloroform and the contents of the beaker evaporated to dryness in a water-bath. The theobromine is obtained in the form of almost perfectly white, micro-crystalline powder which, by ignition upon platinum foil, leaves only traces of ash.—P. Süss (*Ztschr. f. anal. Chem.*), *Apotheker Ztg.*, 1893, 78.

*Lanain*, patented as a pure neutral wool-fat, is put upon the market as a soft, yellowish, homogeneous mass, melting at about 36° C.; it has only a faint odor indicative of its origin and loses this after some time; applied to the skin, this odor is not persistent; it is perfectly neutral in reaction and permanent in air. By mixing with water, it changes to a white, smeary ointment, the surface of which becomes brown on exposure; it is possible to incorporate as much as four times its own weight of water; by incorporating 25 per cent. of water lanolin is obtainable. Lanain is very quickly absorbed by the



skin, so that this property, also possessed by lanolin, is not due to the water contained in the latter. Lanain is offered as a substitute for the different fats and some fixed oils in the preparation of ointments, pomades, etc.—Dr. H. Hirzel, *Apotheker Ztg.*, 1893, 57.

*Permanent physostigmine solutions* can be made by dissolving physostigmine in carbonated water, transferring to small tubes, heating to 100° C. (which expels the excess of carbonic dioxide and sterilizes the solution) and hermetically sealing the tubes. The decomposition, according to Sabbatani, is due to the alkalinity of the solution caused by the solution taking up alkali from the glass and becoming red; the presence of the weakest acid, however, prevents this decomposition.—(*Riforma med.*) *Rundschau*, 1893, 144.

*Distinction between soluble and organized ferments.*—The addition of one per cent. of sodium fluoride immediately and permanently arrests the fermentations caused by organized ferments without interfering with the fermentations produced by soluble ferments. M. Arthus and A. Huber, in examining the action of sodium fluoride upon different fermentations, found that the process of decay, the ammoniacal fermentation of the urine and the alcoholic fermentation of sugar were prevented by the above chemical while the action of saliva, invertin, emulsin, pepsin and pancreatin were not interfered with. In the study of unknown fermentations, the use of sodium fluoride will give important information in deciding the cause of the fermentation.—(*Arch. d. Physiol.*) *Pharm. Centralhalle*, 1893, 70.

*Test for pilocarpine.*—The hydrochlorate of this alkaloid, mixed with calomel, becomes black, if exposed to moist air, or if it be breathed upon. The same reaction is given by cocaine hydrochlorate (*Am. Jour. Pharm.*, 1891, 132) although the color is not so intense.—W. Lenz, *Pharm. Centralhalle*, 1893, 79.

*Teucrin* is the name given by Professor von Mosetig-Moorhof to an extract of the plant *Teucrium Scordium*, found throughout central Germany, and which has been known since the earliest times as an excitant and anti-ferment. The remedy is prepared by making a decoction of the dried plant, concentrating to honey consistency and purifying by addition of alcohol; the filtered solution is evaporated until a specific gravity of 1.15 is obtained, when the extract is sterilized and hermetically sealed in glass vials holding three grams. In appearance it is a dark brown liquid, having a characteristic odor; it

is acid in reaction, ten grams requiring 11.4 cc.  $\frac{n}{10}$  alkali for neutralization; total solids 20.80 per cent., including 4.60 per cent. ash. Other species of *Teucrium*, also *Pulegium vulgare* possess the same medicinal virtue, but in a lesser degree. *Teucrium* has been found a valuable remedy in the treatment of the fungoid local diseases, abscesses; it is used hypodermically and acts by causing increased blood circulation in the diseased part.—(*Wiener. Med. Bl.*) *Pharm. Centralhalle*, 1893, 89.

*Pepsin*.—At a recent meeting of the Berlin Pharmaceutical Society, Dr. F. Witte, speaking upon pepsin, stated that too stringent requirements regarding perfect solubility of pepsin were being made; that from his experience pepsins forming perfectly clear solutions had decreased albumin dissolving power. Pepsin dissolving 4,000 parts albumin could easily be made; he had been manufacturing, for American export, pepsin dissolving 10,000 parts of albumin, for some time. At the Columbian Exposition he intended to exhibit an *absolute pepsin*, but declined to state anything regarding its albumin solvent power.—*Pharm. Centralhalle*, 1893, 92.

*Caffeine-iodol*.—If caffeine and iodol, in molecular proportion, be mixed in alcohol solution, a crystalline addition product separates. The product is of a light gray color, odorless, tasteless and insoluble, or nearly so, in most solvents; it contains 74.6 per cent. iodol and 25.4 per cent. caffeine. As iodol, by prolonged keeping, liberates iodine and thus has injurious effect, the above permanent compound is considered worthy of trial.—E. Konteschweller; *Pharm. Centralhalle*, 1893, 95.

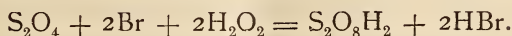
## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*Preparation of hydrobromic acid*.—E. Léger gives the following two processes in *Four. de Pharm. et de Chim.* (Feb. 1893, p. 188):

Introduce KBr into a retort and heat on a water-bath until the salt has attained a temperature of 100°; then add sulphuric acid drop by drop, which causes the hydrobromic gas to become disengaged. However, a small portion of bromine and of sulphurous acid is also liberated. The gaseous mixture is purified by being passed first over a saturated aqueous solution of HBr, containing

an excess of bromine. In contact with this solution, the acid  $S_2O_4$  becomes oxidized according to the equation :



Then the mixture is passed over a saturated aqueous solution of HBr, to which amorphous phosphorus has been added, when it loses all the bromine and is perfectly pure. The gas is dissolved in a distilled aqueous solution of HBr. The acid is nearly colorless and contains no trace of  $S_2O_8H_2$ .

The second mode of preparation of gaseous HBr, is by the action  $S_2O_4$  on Br, in presence of a saturated solution of HBr. The  $S_2O_4$  is passed into a mixture of equal volumes of Br and saturated solution of HBr, when an abundant and regular disengagement of HBr will be obtained, which can be freed of Br and the small quantity of  $S_2O_4$ , by passing over the purifying solutions previously mentioned.  $S_2O_8H_2$  forms at the same time with HBr, and if in sufficient quantity the liquid will separate into two layers.

*Solubility of salicylic acid.*—The employment of salicylic acid to obviate the inconveniences and accidents in surgery and obstetrics due to the use of mercuric chloride, is unsatisfactory because of its sparing solubility. Carcano and Cesaris (*Boll. farm.*, through *Four. de Pharm. d'Anvers*, Feb., 1893, p. 55) propose to associate boric acid with salicylic acid, in the following proportion: boric acid, 12 p.; salicylic acid, 6 p., and water, 1,000 p. This borosalicylic solution has the double advantage of being non-poisonous, and acting as a microbicide.

*Pill-coating.*—The following is M. Fauël's method: The pills are uniformly moistened with a liquid composed of one part of glycerin and two parts of strong alcohol; they are then rolled in a sufficient quantity of impalpable powder, composed of saccharin, 4 p.; gum tragacanth, 2 p., and potato starch, 1 p. Remove the excess of powder by means of a sieve, and repeat the operation. To have the pills white, they are then moistened with glycerin, 1 p.; ether, 2 p., and rolled in a powder composed of equal parts of talc and carbonate of calcium.

The following are the author's formulas for respectively cacao and gelatin coating: I. Cacao, 2 p.; saccharin, 2 p., and gum tragacanth, 1 p. II. Gelatin, 11 p.; saccharin, 5 p.; distilled water, 24 p.—*Pharm. Weekblad*, through *Four. de Pharm. d'Anvers*, Feb., 1893, p. 56.



*Laxative pills.*—A. F. Philippeau gives the following formula in *Jour. de Pharm. et de Chim.*, Feb., 1893, p. 248.

Cascara sagrada, 5 cgm.; extract of nux vomica and extract of belladonna, of each 1 cgm.; powdered ipecac and podophyllin, of each 1 cgm. For one pill, to be taken at night before retiring.

*Preparation of chlorhydrosulphate of quinine.*—Dissolve in the cold 30 parts crystallized quinine sulphate in 24 cc. hydrochloric acid (1.050) and allow the solution to evaporate spontaneously in dry air. A gelatinous layer separates which rapidly forms a hard mass of small agglomerated needles. The salt is very soluble in water, dries again in dry air and loses three molecules of water at 100° C.—*Comp. rend. de l'Acad. d. scien.*

*Potassium iodide ointment.*—Working by the following process a large proportion of potassium iodide can be incorporated with the base. The iodide is pulverized and dissolved in a sufficient quantity of hot glycerin (1 gm. to about 2.50 gm. glycerin); then mix this solution with petrolatum. The solution can be preserved for a long time if kept in yellow glass bottles.—*Bull. de la Soc. de Pharm. de Lyon.*

*Test for iodates in alkali iodides.*—Dissolve 2 gm. of the suspected iodide in 25 cc. of boiled distilled water, shading it from too strong a light. Add a little starch, then 10 cc. tartaric acid solution, when if an iodate is present, a blue color will be *immediately* formed.—Robineau and Rollin, in *Jour. de Pharm. et de Chim.*, Dec., 1892.

*Preparation of camphor by means of ozone.*—M. de Mare utilizes the oxidizing properties of ozone or ozonized air for the preparation of camphor from camphene. The camphene is distilled, the receiver heated, and on submitting it to ozonized air, the camphor begins immediately to sublime on the sides of the cylinder. The camphor thus obtained is identical with the high-priced Japan article.—*Lumière électrique.*

*Preservation of medicinal distilled waters.*—M. E. Crouzel (*Bull. de la Soc. de Pharm. de Bordeaux*, Jan., 1893, p. 17) considers the principal causes of alteration, the use of non-sterilized containers, exposure to air, contact with organic material, and principally filtering through paper. To avoid this latter cause he proposes, if filtering paper is to be used, to first pass a large quantity of simple distilled water through it, and then to submit it to a temperature



sufficiently high to sterilize it. He uses glass for filtering, which, besides retaining the suspended impurities as well as the paper, has the additional advantage of serving indefinitely. He suggests further that the containers should be of such a dimension as to insure rapid emptying.

*Alteration of iodoform preparations.*—When iodoform is dissolved in liquid cacao butter, and the mixture allowed to solidify, exposure to the light will soon cause a reddish coloration. H. Barnouvin (*Four. de Pharm. et de Chim.*, March, 1893, p. 274) finds that while fluid preparations show this change even in the dark, solid iodoform preparations remain unaltered indefinitely if exposure to the light is avoided.

*Benzoparacresol*, analogous to *benzonaphthol-benzosol*, is prepared according to M. Petit by treating paracresol with sodium benzoate in the presence of oxychloride of phosphorus; it crystallizes from hot alcohol in beautiful crystals, having a slight ethereal odor, and a fusing point of 70–71°; insoluble in water, but very soluble in ether and chloroform.—*Four. de Pharm. et de Chim.*, March, 1893, p. 294.

*Purity of zinc.*—According to Lescoeur (*L'Union pharm.*, Jan., 1893, p. 34), zinc, prepared by the double treatment of oxidation by potassium nitrate, and fusion with zinc chloride, is entirely free from arsenic, antimony, sulphur and phosphorus, while the iron, lead, copper, etc., which it still contains, present ordinarily no inconveniences. On the contrary, the presence of these metals facilitates the action of acids and the disengagement of hydrogen.

*Cerberin* is a glucoside obtained from a Mexican plant of the genus *Thevetia*, nat. ord. Apocynaceæ. It is a yellowish, amorphous, bitter powder, easily soluble in water and alcohol; the action of dilute sulphuric acid produces glucose and cerberesin. Dr. Zotos (thesis, Dorpat, 1892) shows its physiological effects on the heart, when administered hypodermically, to be analogous to those of the digitalis group.—*L'Union pharm.*, Feb., 1893, p. 90.

*Myrrholin* is a solution of one part of myrrh in one of oil, and is said to have given good results in tuberculous laryngitis; it is administered in capsules containing 0.20 gm. of myrrholin and 0.30 gm. of creasote.—*L'Union pharm.*, Feb., 1893, p. 95.

*Resorcylalgin.*—On mixing  $\beta$ -resorcyclic acid and analgesin, a pre

cipitate is formed which is soluble in alcohol and slightly so in water, and forms with the alkaline bases soluble salts (resorcinalginates). The ammonium salt is very soluble in water and has a saccharine taste.—A. Petit, in *Four. de Pharm. et de Chim.*, March, 1893, p. 294.

*For chapped hands.*—The following formula is published in *Four. de Pharm. et de Chim.*, March, 1893, p. 295. Green soap, 1 part; compound tincture of benzoin, 4 p.; glycerin, 8 p.; and rose water, 16 p.

*Corn-cure.*—The following formula will be found in *Journ. de Pharm. et de Chim.*, Feb., 1893, 248. Dissolve extract of Indian cannabis 1 part, salicylic acid 10, and turpentine 5, in collodion 82, and add 2 parts acetic acid.

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## BEHAVIOR OF SOME METALS WITH GASES.

BY G. NEUMANN.

The portion of this investigation relative to hydrogen has been executed by the author in conjunction with F. Streintz. Their attention was drawn to the question by the view that lead as the negative plate of a secondary element is capable of occluding hydrogen.

A proof for the correctness of this view could not be obtained by direct electrolytic experiments, as the arrangement of the experiment proved too difficult. Better results were obtained on allowing pure, dry hydrogen to pass through melted lead in a U-tube.

After the gas had been passed for a considerable time, the excess was driven out by nitrogen. Oxygen was then passed through, and this again was expelled by dry air. The water formed by the action of oxygen was received in calcium chloride tubes and weighed, and the quantity of hydrogen absorbed by the metal was thus calculated. In two experiments which could be regarded as successful the result was in one case 0.15 times the volume of the metal, and in the other 0.11 times. Hence the occluding power of lead for hydrogen seems demonstrated.

The next experiments were made with palladium. This metal, as is well known, occludes hydrogen very greedily. The experiments as well as those with other metals still to be mentioned, were executed in an analogous manner to those on lead, *i. e.*, the dry

hydrogen was passed over the heated metal. The metal was used as palladium black. Hydrogen was absorbed to the extent of 502.35 times the volume of the metal.

Platinum was examined as platinum sponge and platinum black. The latter acts more energetically, is raised to redness by absorption without the application of external heat, as is palladium by the absorption of oxygen. Platinum sponge occludes 49.30 times its volume of hydrogen. This figure varies considerably from that found by Graham. For an explanation of this difference we must refer to the original.

Gold occludes relatively much hydrogen; the action of oxygen upon the metal charged with hydrogen is not very strong. In two experiments there were obtained, respectively, 46.32 and 37.31 times the volume of the metal. Here also the values were decidedly higher than those ascertained by Graham. The latter used gold from so-called assay-rolls, whilst the authors employed a preparation obtained by precipitating the chloride with oxalic acid.

Silver absorbs, according to the author's experiments, no hydrogen, whilst, according to Graham, silver wire occludes 0.211 times its volume. Aluminum absorbs 2.72 times its volume of hydrogen in thin sheets previously purified.

Iron in a state of fine division absorbs 19.17 times its volume. Copper occludes about four and a half times its volume.

Nickel, which in its chemical properties is intermediate between copper and iron, behaves similarly in its occlusive power for hydrogen. It occludes 17.57 volumes.

The absorption of hydrogen by cobalt is rather large, and the metal when charged with hydrogen becomes incandescent in a current of oxygen.

The occlusive power of some metals for hydrogen decreases on a repetition of the experiments. The authors explain this in the noble metals by an increase of density. This occurs according also to Graham. Copper and nickel on a repetition of the experiment show the same occlusive power. In the case of iron and cobalt, which behave like the noble metals, the authors have not yet found any explanation.

Neumann has examined the behavior of the precious metals with oxygen by a method analogous to that above described.

The metals were ignited for some hours in pure oxygen, two cal-

cium chloride tubes were then attached before the occlusion tube, and a potash apparatus to observe the rapidity of the gas; the oxygen was displaced by air, and this, again, after cooling, by nitrogen. After the current has passed for half an hour, hydrogen was introduced and heat was applied. The water formed was received in the calcium chloride tubes, which were weighed after they had been successively traversed by nitrogen and air.

Silver on being thus treated absorbed 4.09 vols., which does not agree badly with Graham's result, according to which from 6.15 to 7.4 vols. were absorbed.

Gold absorbed 48.49 vols. of oxygen, whilst Graham observed no absorption. Neumann believes that this difference may be explained by the temperature of the experiment.

In case of platinum, concerning the absorptive power of which for oxygen there is much discrepancy among former observers, Neumann found occlusion of 77.14 vols. With palladium the author found a formation of sub-oxide, since the residue after treatment with oxygen contained 6.99 per cent., whilst  $\text{Pd}_2\text{O}$  contains 7.33 per cent.

Neumann considers that the absorptions of oxygen depend on a power of the metals to become oxidized at about  $450^\circ$ , the temperature of the experiment.—*Zeit. Anal. Chemie*, vol. xxxii, p. 72; *Chem. News*, March 10, 1893.

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## RULES FOR THE SPELLING AND PRONUNCIATION OF CHEMICAL TERMS.

The American Association for the Advancement of Science, at its meeting in 1887, appointed a committee to consider the question of attaining uniformity in the spelling and pronunciation of chemical terms. The work required extensive correspondence and detailed discussion, extending over four years, when in 1891 the following rules were adopted by the Association and recommended to chemists generally, but especially to those engaged in teaching, in the hope that they will cordially unite in the efforts to bring about uniformity in usage. The committee consisted of T. H. Norton, Ph.D., Professor of Chemistry, University of Cincinnati; Edward Hart, Ph.D., Professor of Chemistry, Lafayette College, Easton, Pa.; H. Carring-



ton Bolton, Ph.D., University Club, New York; Jas. Lewis Howe, Ph.D., M.D., Polytechnic Society, Louisville, Ky. The rules have recently been republished by the Bureau of Education, and the spelling has been adopted by several chemical journals, and it is to be hoped that the desired uniformity may be reached before long, even though certain modifications may become desirable, the committee having been well aware that these rules are not to be regarded as final.

#### GENERAL PRINCIPLES OF PRONUNCIATION.

(1) The pronunciation is as much in accord with the analogy of the English language as possible.

(2) Derivatives retain as far as possible the accent and pronunciation of the root word.

(3) Distinctly chemical compound words retain the accent and pronunciation of each portion.

(4) Similarly sounding endings for dissimilar compounds are avoided (hence **id**, **-ite**).

#### ACCENT.

In polysyllabic chemical words, the accent is generally on the antepenult; in words where the vowel of the penult is followed by two consonants, and in all words ending in **-ic** the accent is on the penult.

#### PREFIXES.

All prefixes in strictly chemical words are regarded as parts of compound words, and retain their own pronunciation unchanged (as *ă'ceto-*, *ă'mido-*, *ă'zo-*, *hȳ'dro-*, *ī'so-*, *nī'tro*, *nītrō'so-*).

#### ELEMENTS.

In words ending in **-ium**, the vowel of the antepenult is short if **i** (as *īrī'dium*), or **y** (as *dīdȳ'mium*, or if before two consonants (as

Fāte, fāt, fār, mēte, mēt, pīne, pīn, marīne, nōte, nōt, möve, tūbe, tūb, rüle, mȳ, ȳ = ī.

' Primary accent; '' secondary accent. N. B.—The accent follows the vowel of the syllable upon which the stress falls, but does not indicate the division of the word into syllables.

că'lcium), but long otherwise (as tītā'nium, sělē'nium, chrō'mium).

alūminum	e'rbium	me'rcury	sō'dium
a'ntimony	flū'orin	mōlŷbdenum	strō'ntium
a'rsēnic	gă'llium	nī'ckel	(shium)
bā'rium	germā'nium	nī'trogen	sŭ'lfur
bī'smuth (biz)	glū'cinum	ō'smium	tāntalum
bō'ron	gold	ō'xygen	tellū'rium
brō'mīn	hŷ'drogen	pallā'dium	te'rbium
că'dmium	ī'ndium	phō'sphorus	thă'llium
călcium	ī'ōdīn	plă'tinum	thō'rium
ca'rbon	īrī'dium	potă'ssium	tin
cē'rium	iron	rhō'dium	tītā'nium
cē'sium	lă'nthanum	rubī'dium	tŭ'ngsten
chlō'rin	lead	ruthē'nium	ūrā'nium
chrō'mium	lī'thium	samā'rium	vănā'dium
cō'balt	magnē'sium	scă'ndium	ytte'rbium
colŭ'mbium	(zhium)	sělē'nium	ŷ'ttrium
co'pper	ma'nganese	sī'licon	zinc
dīdŷ'mium	(eze)	silver	zircō'nium

Also: ämmō'nium, phosphō'nium, hă'logen, cŷă'nogen, ämī'dogen.

Note in the above list the spelling of the halogens, cesium and sulfur; **f** is used in the place of **ph** in all derivatives of sulfur (as sulfuric, sulfite, sulfo-, etc.).

#### TERMINATIONS IN -ic.

The vowel of the penult in polysyllables is short (as cŷă'nic, fūmă'ric, arsē'nic, silī'cic, īō'dic, bŭtŷ'ric), except (1) **u** when not before two consonants (as mercŭ'ric, prŭ'ssic), and (2) when the penult ends in a vowel (as benzō'ic, olē'ic); in dissyllables it is long except before two consonants (as bō'ric, cī'tric).

*Exception:* acē'tic or acĕ'tic.

The termination **-ic** is used for metals only where there is a contrast with **-ous** (thus avoid aluminic, ammonic, etc.).

#### TERMINATIONS IN -ous.

The accent follows the general rule (as plă'tinous, sŭlfurous, phō'sphorous; cōba'l'tous).

*Exception:* acē'tous.

### TERMINATIONS IN **-ate** AND **-ite**.

The accent follows the general rule (as *ă'cetâte*, *vă'nadâte*); in the following words the accent is thrown back (as *ă'bietâte*, *ă'lcoholâte*, *ă'cetonâte*, *ă'ntimonîte*).

### TERMINATIONS IN **-id** (FORMERLY **-ide**).

The final **e** is dropped in every case and the syllable pronounced **id** (as *chlō'rīd*, *ī'odīd*, *hȳ'drīd*, *ō'xīd*, *hȳdrōx'īd*, *sū'l-fīd*, *ă'mīd*, *ă'nīlīd*, *mūrē'xīd*).

### TERMINATIONS IN **-ane**, **-ene**, **-ine** and **-one**.

The vowel of these syllables is invariably long (as *mě'thāne*, *ě'thāne*, *na'phthalēne*, *a'nthracēne*, *prō'pīne*, *quī'nōne*, *ă'cetōne*, *kē'tōne*).

A few dissyllables have no distinct accent (as *benzēne*, *xȳlēne*, *cētēne*).

The termination **-ine** is used only in the case of doubly unsaturated hydrocarbons, according to Hofmann's grouping (as *propīne*).

### TERMINATIONS IN **-in**.

In names of chemical elements and compounds of this class, which includes all those formerly ending in **-ine** (except doubly unsaturated hydrocarbons) the final **e** is dropped, and the syllable pronounced **-in** (as *chlō'rīn*, *brō'mīn*, etc., *ă'mīn*, *ă'nīlīn*, *mō'rphīn*, *quī'nīn*, *vanī'llīn*, *alloxă'ntīn*, *absi'nthīn*, *emŭ'lsīn*, *că'ffeīn*, *cō'caīn*).

### TERMINATIONS IN **-ol**.

This termination, in the case of specific chemical compounds, is used *exclusively* for alcohols, and when so used is never followed by a final **e**. The last syllable is pronounced **-ōl** (as *glȳ'cōl*, *phē'nōl*, *crē'sōl*, *thȳ'mōl* (ti), *glȳ'cerōl*, *quī'nōl*).

*Exceptions:* *ălcohōl*, *a'rgōl*.

### TERMINATIONS IN **-ole**.

This termination is always pronounced **-ōle**, and its use is limited to compounds, which are not alcohols (as *ī'ndōle*).

### TERMINATIONS IN **-yl**.

No final **e** is used; the syllable is pronounced **ŷl** (as *ă'cetŷl*, *ă'mŷl*, *cē'rotŷl*, *cē'tŷl*, *ě'thŷl*).

TERMINATIONS IN **-yde**.

The **y** is long (as ä' l d e h y d e).

TERMINATIONS IN **-meter**.

The accent follows the general rule (as hydrō' meter, barō' meter, lactō' meter).

*Exception:* Words of this class used in the metric system are regarded as compound words, and each portion retains its own accent (as cĕ' ntime'' ter, mi'llime'' ter, ki'lome'' ter).

## MISCELLANEOUS WORDS

which do not fall under the preceding rules.

Note the spelling: albumen, albuminous, albuminiferous, asbestos, gramme, radical.

Note the pronunciation: a'lkalīne, a'lloy (n. & v.) a'llo-tropy, a'llotropism, ī'somerism, pō'lymerism, appa-rā'tus (sing. & plu.), āqua regia, bar'y'ta, cĕntigrade, co'n-centrated, crystallīn or crystallīne, electrō'lysis, līter, mōlecule, mō'lĕ'cular, nō'menclā'ture, olĕ'fi-ant, vā'lence, ū'nivā'lent, bī'vā'lent, trī'vā'lent, qua'drivā'lent, tī'trate.

A LIST OF WORDS WHOSE USE SHOULD BE AVOIDED IN FAVOR OF THE  
ACCOMPANYING SYNONYMS.

<i>For</i>	<i>Use</i>
beryllium	glucinum
niobium	columbium
thein	caffein
titer (n.)	strength or standard
titer (v.)	titrate
monovalent	univalent
divalent, etc.	bivalent, etc.
quantivalence	valence
sodic, calcic, zincic,	sodium, calcium, zinc,
nickelic, etc., chlorid,	nickel, etc., chlorid, etc.
etc.	(vid. terminations in <b>-ic</b> supra.)
arsenetted hydrogen	arsin
antimonetted hydrogen	stibin
phosphoretted hydrogen	phosphin
sulfuretted hydrogen, etc.	hydrogen sulfid, etc.
alkylogens	alkylhaloids



<i>For</i>	<i>Use</i>
benzol	benzene
toluol, etc.	toluene, etc.
pyrocatechin	catechol
resorcin, etc.	resorcinol, etc.
hydroquinone (and hydro-	
chinon	quinol
orcin	orcinol
hydrophlorone	phlorol
phloroglucin	phloroglucol
quercite	quercitol
pinite	pinitol
glycerin	glycerol
erythrite, erythroglucin,	
eryglucin, erythroman-	
nite, phycite	erythrol
mannite	mannitol
dulcite, etc.	dulcitol, etc.
sorbite	sorbitol
furfurol	furfuraldehyde
fucusol	fucusaldehyde
anisol	methyl phenate
phenetol	ethyl phenate
anethol	methyl allyl-phenol

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### ARSENIOUS IODIDE.

By D. B. DOTT, F.I.C., F.R.S.E.

The Pharmacopœia does not give specific directions for the preparation of this compound, but states that it is "obtained by the direct combination of iodine and metallic arsenium, or by evaporating to dryness an aqueous mixture of arsenious and hydriodic acids." It is described as "small orange colored crystals, readily and most entirely soluble in water and rectified spirit." The papers of Bamberger<sup>1</sup> and others give much information about arsenious iodide, but our own experience and examination of samples give sufficient additional information to warrant my bringing this note before you. Commercial specimens are met with which contain a large propor-

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<sup>1</sup> *Berichte*, xiv, 2,643.

tion of insoluble matter, uncombined arsenium and arsenious oxide, but we will only take into account those samples which come fairly within the B. P. requirements.

(1) 1·866 gramme treated with warm water, insoluble matter collected on filter and well washed, gave ·024 gramme, = 1·28 per cent. insoluble.

·700 gramme dissolved in water with excess of nitric acid gave 1·077 gramme AgI, = ·582 gramme, Iodine, = 83·15 per cent.

83·55 required for  $\text{AsI}_3$ .

(2) The same salt recrystallized from water and dried by exposure to the air. ·408 gramme gave ·180 AgI, = ·097 Iodine, = 23·84 per cent.

·535 gramme gave ·444  $\text{As}_2\text{S}_3$ , = ·2707 Arsenic, = 50·59 per cent.

(3) 1·469 gramme treated with water, as in No. 1, left ·009 gramme insoluble, = ·61 per cent.; and the solution gave 2·134 grammes AgI, = 1·153 Iodine, = 78·51 per cent. The di-iodide  $\text{AsI}_2$  requires 77·20.

(4) 2·8 grammes arsenious oxide were dissolved in 64 cc. hydriodic acid (11 per cent.), and solution evaporated to dryness with heat of a water-bath, ·891 gramme gave 1·199 AgI, = ·648 iodine, = 72·73 per cent.

These results prove that it is practicable to prepare a salt of composition nearly agreeing with the formula  $\text{AsI}_3$ , but that the tendency is towards a deficiency of iodine, that treatment with water produces extensive decomposition with separation of a very basic salt, and that the alternative method referred to in the Pharmacopœia does not yield a salt of the composition required. We may perhaps infer that this is an instance in which it would be better for the Pharmacopœia not to refer to the methods of preparation but rather to content itself with giving sufficient tests for purity.—*Phar. Jour. and Trans.*, p. 619, Jan. 28, 1893.

## DETERMINATION OF CALCIUM TARTRATE.

BY CH. ORDONNEAU.

We take 20 grms. calcium tartrate, an average sample, pulverize them finely in the mortar, and add 20 cc. of commercial hydrochloric acid at 20°, diluted in 100 grms. of water. The solution may be promoted by heating to ebullition. We make up 202–203

grms., according to the quantity of the insoluble matters, and filter. We take 50 grms. of the solution when cold, and pour it into a flask holding about 90 cc. We add 2 cc. of solution of citric acid at 25 per cent. and then 10 cc. of solution of calcium acetate at 25 per cent. (25 grms. calcium acetate and water to make up 100 cc.) We agitate strongly, when crystals of calcium tartrate form after a few minutes. We then add 5 cc. more of the same solution of calcium acetate, agitate, and allow it to settle for fifteen or thirty minutes. All the tartar is precipitated in a pure state.

We pour the whole upon a plain filter 9 cm. in diameter, detach the tartar adhering to the flask with a slender piece of curved wood, wash the flask and the tartar from the filter with 30 cc. of water in several portions.

The filter is then opened and laid on a plate of copper or sheet-iron above a water-bath. The paper dries enough to permit the separation of the tartar, which is transferred to a round nickel capsule 9 cm. in diameter. The filter is dried completely, the tartar is detached and added to that in the capsule.

The capsule is then placed on the water-bath so as to dry the calcium tartrate completely. The desiccation is promoted by stirring the mass with a very pliable spatula. We cease when the tartar, which forms clots as long as it is moist, begins to flow like dry sand. At this moment we wipe the capsule and weigh the tartar obtained.

The result found, multiplied by twenty, gives the standard of the tartar if we have operated upon 5 grms. of substance. To this must be added 2 per cent. to compensate for the loss on the filter and the solubility of calcium tartrate.

The exact moment of drying must be seized when the calcium tartrate contains  $4\text{H}_2\text{O}$ . Each additional minute causes a loss of 0.10 per cent. of tartar, but as the point is easy to seize (for it occurs suddenly on stirring the substance), there is no error in this respect beyond 0.20 per cent., which may be neglected.

By this process there are formed calcium tartrate, calcium chloride, and free acetic acid, which has no action on calcium tartrate. As the precipitation of the tartar is always effected in a very acid liquid, malic acid, if it is present, remains in solution and does not falsify the results.

The object of the citric acid is to dissolve the aluminium phosphate, which forms a lake with the coloring matter, and which the

acetic acid does not dissolve. It is also without action upon calcium tartrate. It is preferable to precipitate in two portions, since the crystals of tartar are thus coarser, which renders it easier to seize the exact moment when the moisture is expelled.

If we wish to determine the total acidity of any tartar we must operate in the same manner, adding 25 cc. of solution of calcium acetate in two portions. This quantity is sufficient for 5 grms. pure potassium bitartrate, and consequently the process is general.

The calcium tartrate must be washed, collected, and weighed. We have then to add 2 per cent. to the amount found, and on multiplying the calcium tartrate by 0.576 we have the value in tartaric acid.

*Second Process.*—We take 50 grms. of the solution of tartar, which is poured into a porcelain capsule and heated to ebullition. We add then some drops of solution of phenolphthalein, and then gradually, and with continual stirring, a clear milk of lime which has been strained through silk. The source of heat is extinguished or removed as soon as “bumping” sets in; the saturation is continued, giving the calcium tartrate time to subside after each addition of lime, and ceasing when neutrality is reached, which requires about five minutes. We add then to the liquid 2 cc. of the citric solution at 25 per cent., stir and allow it to subside. After some minutes, the temperature is 50° to 60°, when we decant, pour the tartar upon a plain filter of 0.09 metre, and wash with 30 cc. of water.

The calcium tartrate is dried as above, taking care not to break the filter. To the result obtained we add 4 per cent. for the solubility of the substance in the liquid and the loss on the filter. Even if the quantity of malate exceeds 20 per cent., which is a very rare case, we need add only 3 per cent. for accuracy, as the solubility is then lower. The quantity of malate is found by the deficiency of the result plus the insoluble matters to make up 100. On operating thus on pure calcium tartromalate, or on a mixture of the two salts in equivalent proportions, we find 99.50 per cent. of calcium tartrate almost free from malate.

This process has the advantage of serving for industrial refining. In place of adding citric acid we leave a slight acidity, which dissolves the alumina and the phosphates. The tartar obtained is pure if the liquid is decanted whilst lukewarm, for complete refrigeration precipitates the calcium tartromalate to the extent of about 10 per



cent. of the tartar operated upon. This salt is collected and utilized in a fresh operation.—*Bull. Soc. Chim., Paris*, series 3, ix-x, p. 68; *Chem. News*, March 10, 1893.

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## EUROPHEN<sup>1</sup>

BY DR. EICHOFF.

In July, 1891, Eichoff gave a favorable account of the action of europphen, which is the iodide of isobutylorthocresol. It is an amorphous yellow powder, with a slightly aromatic smell, not soluble in water and glycerin, but very soluble in alcohol, ether and chloroform. It is soluble too in collodion and oil. Eichoff reported a series of cases in which he had used it with great advantage in ulcers for the most part specific, scrofuloderma, and lupus exedens. In some cases he employed simply powdered europphen, in others he used ointments of various kinds, containing usually 5 per cent. of europphen. No good consequence followed its use in gonorrhœa, psoriasis, parasitic diseases, and urticaria.

He also injected a 1.5 per cent. solution of europphen in olive oil, each injection containing  $\frac{1}{4}$  of a grain. This gave rise to no pain or local troubles. After the injection of larger doses, patients complained of pain in the head and liver, and he advised that at first the smaller doses should be used, though afterwards the amount might be increased. The injections of europphen were chiefly used in syphilitic affections and lesions, and seemed to be of value.

In the *Therap. Monat.*, for January, 1893, Eichoff points out that many observers have confirmed his views as to the utility of europphen. After further experience, however, he is inclined to abandon its subcutaneous use in syphilitic ailments, since the benefit it causes is only temporary, but as an external application in syphilitic soft ulcer, he finds it of very great advantage. After washing the ulcer he applies the powder, covering the whole with wadding. Where the surface of the ulcer is raised, he first touches it with nitrate of silver. He points out that it must not be used with or soon after a sublimate solution, for then irritation is set up, owing to the iodide of mercury formed. In scrofuloderma and lupus exedens, he used either a 3 per cent. ointment or the powder, and found cicatrization follow. It was of no service, however, where the lupus and scrofu-

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<sup>1</sup> Medical Chronicle, February, 1893, p. 331.

lous surfaces were more or less covered with epidermis. He says also that it is of use in gonorrhœa of women with ulcerations in the vagina and on the cervix uteri.

He looks upon euophen, then, as a substitute for iodoform, over which it has the advantage of causing no injurious effects after absorption, and having no unpleasant smell.

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### PIPERAZINE.<sup>1</sup>

By W. MAJERT and A. SCHMIDT.

Erroneous statements have appeared in several modern textbooks regarding the physical and chemical characters of piperazine,  $C_4H_{10}N_2$ , which have been confused with those ascribed by A. W. von Hofmann and by Ladenburg to the impure substances of like composition discovered by them, and termed respectively diethylenediamine and ethyleneimine or diethylenediimine; our attention has been directed to the fact that this misunderstanding has partly arisen from a misconstruction of our views (*Ber.*, 1890, 3719) as to the identity of these substances: we, therefore, desire to correct this impression.

Piperazine, which was not known in its pure crystalline condition until prepared by us in August, 1890, by treatment of dinitrosodiphenylpiperazine with alkali, is a crystalline substance melting at  $104-107^\circ$  in capillary tubes, although when the melting point is determined on large quantities it is found to be  $112^\circ$ , the differences being due to the hygroscopic nature of the base; it boils at  $140-145^\circ$ . It is very readily soluble in water and alcohol, the aqueous solution having a distinctly alkaline action. It is very hygroscopic and readily absorbs carbon dioxide, being thereby converted into the carbonate melting at  $162-165^\circ$ .

Piperazine is especially characterized by the formation of an insoluble pomegranate-red double salt with bismuth iodide and by a dibenzoyl compound melting at  $191^\circ$ .

The basic substance diethylenediamine prepared by Hofmann by the interaction of ammonia and ethylene bromide consisted of a liquid mixture of bases boiling approximately at  $170^\circ$ . That this mixture contained a small quantity of a base identical with piperazine

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<sup>1</sup>*Chem. News*, March 3, 1893, p. 108; from a paper read before the Chemical Society.

zine is undoubted, but it was only after piperazine had been prepared from dinitrosodiphenylpiperazine that Hofmann succeeded in identifying it and isolating the pure crystalline product from the mixture, which, besides higher ethylene bases, contained also a number of vinyl compounds.

Owing to the difficulty of purifying small quantities of the base, Ladenburg's experiments with diethylenediamine, obtained by the decomposition by heat of ethylenediamine hydrochloride, were unsuccessful: the product described by Ladenburg as the base was undoubtedly impure piperazine carbonate, as proved by its melting point, 159–163°.

In conclusion, it may be interesting to mention that we have succeeded in preparing the following series of hydrates of piperazine, that most readily formed being a hexhydrate which crystallizes from dilute aqueous solutions:

$C_4H_{10}N_2 \cdot H_2O$ , m. p.	75°
“ $2H_2O$ , “	56°
“ $3H_2O$ , “	39–40°
“ $4H_2O$ , “	42–43°
“ $5H_2O$ , “	45°
“ $6H_2O$ , “	48°

## COCA LEAVES.<sup>1</sup>

BY O. HESSE.

In this paper, the author gives a short account of the various substances which have been obtained from coca leaves; with a few exceptions, most of the compounds here referred to have been previously described by the author (A. J. Ph., 1889, p. 296), Liebermann, Einhorn, Giesel and others (see Am. Jour. Phar., 1889, 433; 1890, p. 422; 1892, p. 44).

*Cinnamylcocaine hydrochloride*,  $C_{19}H_{23}NO_4 \cdot HCl + 2H_2O$ , crystallizes from water, in which it is readily soluble, in lustrous plates, loses its water at 66°, and melts at 176°; its specific rotatory power in aqueous solution is  $[\alpha]_D = -104.1$ . The *platinochloride*,  $(C_{19}H_{23}NO_4)_2H_2PtCl_6$ , crystallizes in small needles, and is moderately easily soluble in boiling water. The *aurochloride*,  $C_{19}H_{23}NO_4 \cdot HAuCl_4$ , crystallizes in small yellow needles, and melts at 156°. The *methiodide*,  $C_{19}H_{23}NO_4 \cdot MeI$ , crystallizes from alcohol in small,

<sup>1</sup> *Annalen*, **271**, 180–228; Jour. Chem. Soc., 1893, Abstr. I, p. 57.

colorless needles; the corresponding *methochloride* is a crystalline substance, readily soluble in water and alcohol, but insoluble in ether.

The molecular formula of *homococaïc acid*, determined in glacial acetic acid solution, was found to be  $C_9H_8O_2$ . This acid melts at  $150^\circ$ , and dissolves freely in alcohol, ether, chloroform, glacial acetic acid, and hot water, but is only sparingly soluble in light petroleum and cold water; it is only slowly oxidized by a warm solution of potassium permanganate. A number of its salts were prepared and analyzed, but they are all amorphous, ill-characterized compounds. The *nitro*-derivative,  $C_9H_7O_2NO_2$ , prepared by warming the acid with nitric acid of sp. gr. 1.52, crystallizes from dilute acetic acid in yellowish needles, melts at  $226^\circ$ , and is readily soluble in alcohol and glacial acetic acid, but more sparingly in chloroform, ether and boiling water.

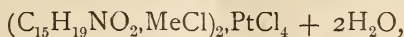
$\beta$ -*Cocaïc acid*,  $C_{18}H_{16}O_4$ , is formed when homococaïc acid is heated for a long time with concentrated hydrochloric acid, or fused with potash; it crystallizes from boiling water in long, colorless needles, melts at  $189^\circ$ , and is readily soluble in glacial acetic acid, alcohol and chloroform, but more sparingly in benzene, and almost insoluble in light petroleum; its molecular weight was determined in glacial acetic acid solution, with results in accordance with the molecular formula given above. It is only very slightly acted on by potassium permanganate. The *potassium* salt crystallizes in lustrous prisms, and is readily soluble in cold water. The *copper* salt,  $C_{18}H_{14}O_4Cu + 2H_2O$ , is a green, crystalline compound, and loses its water at  $160^\circ$ , becoming dark-blue. The *silver* salt,  $C_{18}H_{14}O_4Ag_2$ , is stable in the light. The *methyl* salt,  $C_{18}H_{14}O_4Me_2$ , is a mobile oil. The *dinitro*-derivative,  $C_{18}H_{14}O_4(NO_2)_2$ , prepared by treating the acid with concentrated nitric acid, crystallizes from glacial acetic acid in pale yellow prisms, melts at  $252^\circ$ , and is readily soluble in alcohol, chloroform, glacial acetic acid and ether, but more sparingly in water.

$\beta$ -*Isococaïc acid* or  $\delta$ -*truxillic acid* (compare Liebermann, Berichte, 1889, 2249), prepared from isococaïc acid in like manner, has the molecular formula  $C_{18}H_{16}O_4$ ; it melts at  $172^\circ$ , not at  $174^\circ$ , as stated by Liebermann. The *barium* salt,  $C_{18}H_{14}O_4Ba + 4H_2O$ , crystallizes in short, lustrous prisms; the *copper* salt crystallizes with 2 mols.  $H_2O$ . The *dinitro*-derivative,  $C_{18}H_{14}O_4(NO_2)_2$ , crystallizes from



dilute acetic acid in small, almost colorless prisms, melts at  $226^{\circ}$ , and is very readily soluble in alcohol and ether, but almost insoluble in benzene.

*Benzoylpseudotropëine methiodide*,  $C_{15}H_{19}NO_2MeI$ , forms colorless crystals, and is moderately easily soluble in hot, but only sparingly in cold alcohol. The corresponding *methochloride*,  $C_{15}H_{19}NO_2, MeCl$ , crystallizes in colorless needles or prisms; its *platinochloride*,



forms small, orange needles, and is sparingly soluble in cold water; its *aurochloride*,  $C_{15}H_{19}NO_2, MeCl, AuCl_3$ , is a yellow, crystalline compound, sparingly soluble in cold water.

*Pseudotropine methiodide*,  $C_8H_{15}NO, MeI$ , crystallizes from hot water in small, colorless, rhombic crystals, and melts at  $270^{\circ}$ . The *methochloride*,  $C_8H_{15}NO, MeCl$ , forms compact, rhombic crystals, and is readily soluble in water, but only sparingly in alcohol; its *platinochloride*,  $(C_8H_{15}NO, MeCl)_2, PtCl_4$ , separates from hot water in crystals, and melts at  $216^{\circ}$ .

*Palmityl  $\beta$ -amyirin*,  $C_{46}H_{80}O_2$ , occurs in Trujillo coca; it melts at  $75^{\circ}$ , dissolves freely in ether, chloroform, light petroleum, hot alcohol, and acetone, and has a specific rotatory power  $[\alpha]_D = 54.5^{\circ}$  in alcoholic solution; on hydrolysis, it yields palmitic acid and  $\beta$ -amyirin. The wax obtained from the broad-leaved coca of Peru and Bolivia consists of palmityl- $\beta$ -amyirin and cerotone,  $C_{33}H_{106}O$ , melting at  $66^{\circ}$ ; the wax from Java coca seems to consist of palmityl- $\beta$ -amyirin, cerotone, ceryl cerotate, myristyl- $\beta$ -amyirin, and a substance which the author names hydroxycerotic acid.

*Hydroxycerotic acid*,  $C_{27}H_{54}O_3$ , melts at  $82^{\circ}$ , and dissolves freely in hot alcohol and light petroleum, but is only very sparingly soluble in cold ether.

*Cerotolic acid*,  $C_{27}H_{52}O_2$ , is formed when hydroxycerotic acid is heated at  $100^{\circ}$  with acetic anhydride for eight days; it crystallizes in short prisms, and is moderately easily soluble in cold ether and light petroleum.

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**Sulphur.**—Attention has been drawn by Prof. Schulz (*Berl. klin. Wochenschrift*, 1892, No. 13) to the value of sulphur in certain cases of chlorosis in which iron proves inefficient, and which are not complicated with catarrhal and inflammatory conditions of the digestive tract. The sulphur was used in the form of flowers of sulphur mixed with sugar of milk, as much being taken three times a day as would lie on the point of a knife.

THE PHYSIOLOGICAL ACTION OF THE ACTIVE PRINCIPLES OF URECHITES SUBERECTA.<sup>1</sup>

BY RALPH STOCKMAN.

The *Urechites suberecta* belongs to the natural order *Apocynaceæ*, and grows abundantly in Jamaica and other West Indian islands, where it is known as the "Savannah flower" or "yellow-flowered nightshade." It is notoriously poisonous, and is supposed to have been the chief poison used by "Obeah men" in the time of slavery.

Bowrey separated from the leaves two active substances—*Urechitin* and *Urechitoxin*. These are both glucosides, with an intensely bitter taste when in solution; the former is insoluble, the latter slightly soluble in water. Experiments with urechitin showed that it is a very active poison, similar in its general action to digitalin. The isolated frog's heart in "Williams' apparatus" was killed in nine minutes by a solution containing 1 part in 200,000, and in two hours by a solution of 1 in 10,000,000. The blood pressure in rabbits was raised in the early stages of poisoning, and fell in the later stages until the heart stopped beating. Rabbits were much less susceptible to the poison than dogs. Urechitoxin also proved to be a muscle and heart poison, but very much less active than urechitin; neither substance caused contraction of the blood vessels of the frog when locally applied. With regard to the marvellous stories told of the poisonous action of the plant, there is a certain admixture of truth and falsehood: a full lethal dose will be fatal within a few hours or a day or two; a single dose of the poison cannot be so administered as to be fatal after the lapse of days or weeks. On the other hand, if repeated minute doses be given, there seems to be no doubt that an animal or man may remain all the time in apparently good health and then die suddenly. The explanation of the long-delayed action and sudden death in such cases is to be found in the well-known accumulative action of digitalin and similarly acting bodies; the small repeated doses cause an accumulation of the poison in the heart muscle until a stage is reached when the heart is so thoroughly poisoned that death ensues from cardiac failure.

<sup>1</sup> *Laboratory Reports of the Royal College of Physicians, Edinburgh*, Vol. iv; *Medical Chronicle*, February, 1893, p. 330.

It is improbable that *Urechites suberecta* will ever prove to be of value as a cardiac tonic, as it possesses, in a high degree, the objectionable accumulative properties which have been so often remarked in the case of digitalis.

## A FALSE KAMALA.<sup>1</sup>

BY HENRY G. GREENISH, F.L.S.,

Lecturer on Materia Medica to the Pharmaceutical Society of Great Britain.

Although few drugs are subject to such systematic admixture, accidental or intentional, as kamala, substitutions are comparatively rare. I was therefore attracted by the unusual appearance of five samples of kamala from Bombay (representing a bulk of about  $7\frac{1}{2}$  cwt.) that were exhibited on a broker's table a few days ago; the drug was coarser than genuine kamala usually is, not so mobile and evidently of a heterogeneous nature, a dark brown powder adhering to the finger when passed through it. For a second sample of this drug I am indebted to Mr. Moss.

A cursory examination under the microscope showed, amongst much vegetable débris, a number of dark reddish-yellow particles; these, under a higher power, proved to be pollen grains; they are marked with numerous projections, and provided with three pores from which, under the influence of suitable reagents, the pollen tubes can be made to protrude.

The nature of the vegetable débris that accompanies these grains became more evident after warming for a few minutes in dilute (1 per cent.) solution of caustic potash and washing with water. Portions of narrow petals, a bifid style, and other fragments were isolated without difficulty, and enabled me to identify the bulk of the drug as consisting of a coarse powder of safflower florets (*Carthamus tinctorius*). To confirm this, safflower florets were dissected, the parts examined, and compared with fragments separated from the kamala in question.

The pollen grains are identical in shape, appearance and size.

The corolla-limb of the safflower floret is sharply characterized by the secretion tubes which run parallel to the two fibrovascular bundles and between them and the margins; they are usually more or less completely filled with a red-brown mass; the epidermal cells

<sup>1</sup> *Phar. Jour. and Trans.*, March 11, 1893, p. 745.

are mostly long and narrow, with sinuous longitudinal walls (not well seen after the action of caustic potash). These characters can all be recognized and identified in the so-called kamala.

In like manner the syngenesious anthers can be distinguished and identified by the presence of elongated pitted cells, with thickened walls, and by the tissue by which they mutually adhere. Lastly, the epidermal cells of the style develop towards the apex into short hairs; these are also observable.

In addition to the small starch grains derived from the corolla tube of the safflower, the drug contains larger angular grains, isolated or in compact masses, which I have not been able to find in safflower, and also lignified tissues, apparently the pericarp of a small fruit. I have compared these latter with the pericarp of safflower fruits, kindly furnished me by Mr. Holmes and by Mr. Jackson, of Kew; they are not identical.

The presence in the drug of about 16 per cent. of ash, much of which is sand, points to careless collection; numerous acari and small beetles indicate careless preservation. Portions of the bodies of the former insects are especially frequent in the microscopic field.

From these data I conclude that the kamala is carelessly collected and badly preserved safflower, mixed with much extraneous matter, and reduced to coarse powder.

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### NOTE ON SESAMIN.<sup>1</sup>

By JAMES F. TOCHER.

In 1891 the author had given in a paper read to the Society an introductory notice of a crystalline substance which he had isolated from sesame oil (see *Amer. Jour. Phar.*, 1891, p. 142) and to which he gave the name of "sesamin." He now submitted the results of further experiments on the substance. As he had stated in his former paper, sesamin is extracted from sesame oil by means of solvents, such as acetic acid and alcohol. The proportion of solvent may vary according to its nature and strength. The proportion of glacial acetic acid—98 per cent. he originally used—was seven volumes to ten of sesame oil, but he found sesamin to be

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<sup>1</sup> *Chemist and Druggist*, February 18, 1893. Abstract of a paper read before the North British Branch of the Pharmaceutical Society.



quite soluble in 90 per cent. acetic acid. The sesamin might be obtained from the separated solvent in the crystalline state by two methods, the better of which consisted in evaporating over a water-bath until the solvent had been removed, saponifying the oil present by means of solution of potash, which had no action on sesamin, and setting aside for a few hours until sesamin has deposited. The supernatant fluid is then removed. The sesamin is repeatedly washed with hot water, and recrystallized from alcohol. This method of purification completely gets rid of the impurities. With the sesamin extracted and purified by this mode he performed six combustions: the results showed that the composition of sesamin is expressed by the formula  $C_{18}H_{18}O_5$ . At 20° C. 100 grains of alcohol dissolve 0.27 grain sesamin, and 100 grains of boiling alcohol dissolve 8.07 grains. The specific gravity of sesamin was formerly found to be 1.305. The ordinary methods employed to determine the constitution of organic compounds gave no satisfactory results as regards sesamin; the evidence indicated that it did not correspond to any known substance. It had been shown to be devoid of acid or basic properties and, judging from its behavior with alcoholic potash, nitric acid, etc., it might come under the term "neutral resin" or resin anhydride as used by Dragendorff to describe oxygenated bodies (occurring along with resin acids) which were insoluble in alkalies. As he had pointed out in his previous paper, sesamin assumed a green and afterwards a bright-red color in contact with nitro-sulphuric acid. A similar coloration was produced on sesame oil by nitro-sulphuric acid, as pointed out by Behrens—a reaction which no other oil exhibited, so that undoubtedly the cause of the coloration was sesamin. Owing to the minute proportion of sesamin present in the oil (.04 to .06 per cent.) he had not been able to extract a sufficient quantity to make a thorough investigation into its constitution.

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#### MANUFACTURE AND COMPOSITION OF LINSEED CAKE AND MEAL.<sup>1</sup>

A paper by Haselhoff, published in the journal named, states that flax is chiefly grown in Germany for the flax; for seed it is almost only grown in Mecklenburg and Königsberg, and the seed is not of

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<sup>1</sup> (*Landw. Versuchs-Stat.*, **41**, 55-93.) *Jour. Chem. Soc.*, 1893, Abstr. II, 38.

very good quality for the production of oil. The American seed is of about the same quality; the Indian (Bombay) is better, whilst the best seed is that from Russia, especially South Russia. Most of the impurities are removed by sifting; when there remains only 4 per cent. of foreign matter (or even 8 per cent. if the foreign matter consists of oily seeds), the seed is practically pure. With regard to the manufacture of linseed oil, the original method consisted in pounding the seeds. Now there are two methods by which the oil is pressed out; in the one heat is applied to the vessel containing the seeds (either by direct firing or steam); in the other, the seed is directly treated with superheated steam. Another method is to extract with light petroleum. The residue (cake or meal) varies in composition according to the method employed. Thus, whilst the residue from pressed seeds contains about 32–36.4 per cent. of protein and 9–11 per cent. of fat, the residue from extracted seeds contains more proteids (40 per cent.) and less fat (3–4 per cent.). The amount of mucilage also varies; where direct steaming is employed the amount is diminished, and cake so obtained will keep for years without becoming mouldy. This is also the case with cake prepared by the light petroleum method, but this seems to be due, not to the abstraction of mucilage, but to the action of the light petroleum.

For adulteration, not only vegetable substances but also heavy spar, gypsum, chalk and salt are employed; saw-dust has been found. Rape-cake meal may be detected by stirring in water in a glass cylinder and allowing to settle; if any dark particles are visible, rape is probably present. A few drops of aqueous alkali will give an intense yellow color if rape is present. Amygdalin does not seem to be actually injurious, but mustard, corn-cockle, and *Camelina* are said to be injurious, whilst castor oil is poisonous and may cause death. Vegetable impurities can mostly only be detected microscopically and the amounts only approximately estimated. But the amount of fat, and especially of protein, give a good idea as to purity or otherwise. When mineral impurities are present they may be detected by the amount of ash, which generally should not exceed 5 per cent. Cake containing over 14 per cent. of water cannot be considered as pure.

With regard to fat, it should be noted what results are obtained when the substance is (1) not previously dried, (2) when dried for two

hours at 100–105°, and (3) when dried for two hours at 100° in an atmosphere free from oxygen; the results should not differ. The rancidity of the fat is determined (1) after the fat has been so long dried that it no longer has an unpleasant odor, and (2) without previous drying. The first estimation gives a lower result than the second, from loss of volatile fatty acids. The higher the percentage of acid the greater the difference in the two experiments; the estimation of rancidity of linseed residues and in foods generally should therefore be made in the fat from undried substance. The cake and meal were also examined bacteriologically; large numbers of micro-organisms were found, but the results give no indication of the quality of the substance examined, as the nature (injurious or otherwise) of the micro-organisms is not known.

A second paper on the same subject, by F. J. Van Pesch contains the following information: Only very little of the linseed worked in Holland is produced in that country; much is obtained from Russia, but most from India. The composition of samples of cake examined at Wageningen varied as follows: proteids (22–37), fatty matter (6.2–18.5), starchy matter (30), water (11–16), ash (4.5–8.6), and crude fibre (7.3–12.3 per cent.). The average amount of digestible matter (according to Kühn), would therefore be: proteids 26, fatty matter 10.4, and starchy matter 24.3 per cent. The origin of the seed has a great influence on the quality of the cake. According to Voelcker, the Russian seeds contain most albumin; those grown further south contain the most fat. The method for the microscopic examination of linseed was described by Kobus, (*Landw. Jahrb.*, 1884, 120). The chief weeds which occur in linseed are *Polygonum Convolvulus* and *lapathifolium*; rape is very frequent, whilst *Camelina dentata*, *Galium Aparine*, *Thlaspi arvense*, and *Agrostemma Githago* also occur. Less frequent are *Brassica nigra*, *Sinapis arvensis*, *Plantago lanceolata*, *Lolium* and other grasses. Besides these seeds which occur naturally, stalks and sand are sometimes found. In Belgium, rice meal and earth-nut skins are frequently added.

Cake manufactured by the so-called American method, in which the finely-powdered seed is extracted by carbon bisulphide, only contains 3–4 per cent. of fatty matter, and is therefore not used in Holland. The method employed for the examination of cake is as follows: The sample is made to pass through a 5 mm. sieve, and 5



grams stirred in a beaker with 100 cc. of boiling water. Beakers of one size are employed, so that the more or less swelling of the powdered cake and the smaller or greater amount of liquid which separates can be compared. It is also noticed whether the liquid is quite thin or whether it is slimy. With regard to the swelling up, *Camelina* swells considerably more than linseed. Kobus (*loc. cit.*) found that 1 gram of linseed kept in water for one hour weighed 2.7–2.8 grams, whilst 1 gram of *Camelina* weighed 4.4 grams after the same treatment. A part of the liquid is tested with iodine for starch; only a light blue color should be produced. The residue obtained when the water is poured off is examined microscopically (Kobus, *loc. cit.*). The number of foreign particles is estimated in 5 grams, the separation being effected by a jet of water on the substance in a 1.2 mm. sieve. Determinations of proteïds, fat, and ash are also made.

The injurious substances sometimes found in linseed cake are corn-cockle, containing a poisonous substance, saponin or githagin, the seeds of *Thlaspi arvense*, which, when eaten by cows, impart a garlic-like taste in the milk, the hemp seed, which causes diarrhœa. Barium sulphate is objectionable, whilst salt, besides being good for cattle, has the advantage of making the cake softer; on the other hand, the cake becomes quickly moist and therefore spoilt. The poisonous action of castor oil beans was first shown by van den Berghé. Other substances doubtless occur which are more or less poisonous or injurious when much of them is present.

The results of experiments made at Wageningen show that in 5 grams of substance it requires only 16 seeds of *Polygonum lapathifolium*, 13 of *P. Convol.*, 4 of *Galium Aparine*, and 46 of *Camelina* to make 1 per cent. of the cake. Each seed is reckoned as follows: *Camelina* 2, *Polygonum lap.* 6, *P. Convol.* 8, *Galium Aparine* 25; if the sum of the numbers found exceeds 100, the cake is not pure enough.

In most cases it is sufficient to magnify 70–80 times, but in some cases 300 times. For the detection of very finely-powdered substances in cake, a test tube is half filled with the powdered cake, treated with alcohol, well shaken, and allowed to settle; the alcohol is poured off and some of the fine meal which floats on it put on an object glass. The alcohol is evaporated, a drop of glycerol and aqueous soda added and pressed with a second glass. When



magnified 300 times, earth-nut meal is readily distinguished; it is seen as ring-shaped depressions. Other substances than earth-nut meal can only be detected by special methods.

## A METHOD FOR PRESERVING SPIRITUS ÆTHERIS NITROSI.<sup>1</sup>

BY A. MELDRUM.

With the object of ascertaining the effects of light and heat on the composition of the spirit, and whether the addition of glycerin would have any influence, beneficial or otherwise, on the chemical changes which took place during the storage of it, the writer had made a number of experiments. A strong spirit of nitrous ether was made by the pharmacopœial process. One part of it was diluted with rectified spirit, as directed in the Pharmacopœia; a second part with rectified spirit and glycerin, so that the finished product contained 5 per cent. by volume of glycerin; and a third part with rectified spirit and glycerin, so that the finished product contained 10 per cent. of the latter. The various samples were exposed to different temperatures and degrees of light for a month, and then examined for NO gas by Allen's process, for aldehyde by Thresh's method, for free nitrous acid, for free acetic acid, and for total free acidity—the last three having been examined by the method described by Mr. Peter MacEwan, but substituting alcoholic for aqueous solution of soda. To eliminate the influence of light when the effect of temperature was registered, three sets of samples were kept in the dark, one at a temperature averaging 35° F., another at temperature 55° to 60°, and a third at from 70° to 75°. To eliminate the influence of temperature when the results of exposure to light were wanted, one set was kept in the dark, a second was exposed to diffuse daylight, and a third to direct daylight, the temperature in every case having been the same, viz: from 55° to 60°. The results, which were detailed in tabulated form, showed that the effect of increased temperature tended to cause, first, loss of ethyl nitrite; second, slight diminution of the aldehyde; third, increase of free nitrous acid; fourth, increase of acetic acid; and, fifth, consequent

<sup>1</sup> *Chemist and Druggist*, February 18, 1893. Abstract of a paper read at Edinburgh, February 15, before the North British Branch of the Pharmaceutical Society.

increase of total free acidity. Five per cent. of glycerin tended to diminish the loss of ethyl nitrite, and retarded the formation of aldehyde and free acids, while the addition of 10 per cent. prevented, in great measure, the loss of ethyl nitrite, retarded the formation of acetic acid and total acidity, and reduced the percentage of aldehyde and nitrous acid as temperature increased. The effect of light was to cause loss of ethyl nitrite, and increase of nitrous acid, free acetic acid, and total acidity. The addition of glycerin had results similar to those attending its use in temperature tests. On the whole, the writer stated, the addition of glycerin at least in a proportion of 10 per cent. by volume is favorable to the keeping of the spirit without entailing much trouble. The solution of pure ethyl nitrite in absolute alcohol, although not liable to alteration, does not seem to have come into general use—possibly on account of the price, or, as suggested by Professor Leech, on account of the large proportion of alcohol it contained, which might be undesirable in some cases. On the other hand, the addition of glycerin to sweet spirit of nitre, while tending to preserve it, would not alter its characteristic taste or smell to any appreciable extent, and, if adopted, it might obviate the necessity of introducing the more expensive solution of ethyl nitrite in glycerin and the absolute alcohol. Experiments had also been made to show the effect of stoppering, and the results of badly-fitting stoppers were loss of ethyl nitrite, loss of aldehyde, increase of free nitrous acid, and decrease of acetic acid and total acidity.

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## MINUTE OF COLLEGE MEETING.

PHILADELPHIA, March 27, 1893.

The annual meeting of members of the College was held this day in the museum of the new building, Charles Bullock presided. Mr. Bullock, in calling the meeting to business, referred in appropriate words to the fact that this was the first assemblage of members for this purpose held in this room; that the occasion was suggestive of reflection and thought, and marked an important era in the growth and extension of this institution—the conspicuous representative in our country of similar institutions; that the College had now advanced in all its appointments to an entitled position and rank, and that a consciousness of this should awaken new zeal and interest in maintaining its deserved prominence and usefulness. The minute of the previous meeting was read and by resolution adopted. The minutes of the meetings of the Board of Trustees for January, February and March were presented, and on motion approved. This occasion being that of the annual meeting the follow-

ing reports were submitted and directed to be entered in extenso upon the minutes. The Committee on Publication reported the prompt and regular issuance of the American Journal of Pharmacy, and stated that its status in the literature of the science was fully and ably maintained. The Editor of the Journal in presenting his report states that the progress of rebuilding which had been entered upon proved an interruption to much of the investigating and research work of the laboratories, but an increased interest will assuredly be an outgrowth of the additions and facilities now offered, and still more satisfactory results may be expected for the future from the Pharmaceutical Meetings in developing new topics of inquiry.

Detailed statements of the Business Editor and the Treasurer of the Publication Committee were made and ordered to be extended upon the minutes. The Librarian in report submitted states that the volumes are being re-labelled, arranged and catalogued on the shelves of the new library cases, and that this work will be diligently prosecuted to completion. The Curator reported the cabinets and cases of specimens as being in good order and system. Also that quite a number of specimens and additions had been made to the collections, suggesting that modifications for space and arrangement could be judiciously added.

Prof. Remington spoke of the labor which had devolved upon the Curator, and expressed for himself and on behalf of his fellow-members a grateful appreciation.

Prof. Maisch reported from the Board of Trustees the following propositions for honorary membership, with the favorable recommendation of the Board: Alfred H. Allen, F.I.C., F.C.S., Sheffield, England; Prof. Dr. Friedrich Conrad Beilstein, St. Petersburg, Russia; Prof. Dr. Emil Fischer, Berlin, Germany; Prof. Dr. Carl Remigius Fresenius, Wiesbaden, Germany; Thomas B. Groves, F.C.S., Weymouth, England; Prof. Dr. Edouard Heckel, Marseille, France; David Hooper, Quinologist, Ootacamund, India; Prof. Dr. Oscar Liëbreich, Berlin, Germany; Prof. Dr. Christian Luerssen, Königsberg, Germany; Prof. Dr. Demetrius Mendelejeff, St. Petersburg, Russia; Prof. Dr. Victor Meyer, Heidelberg, Germany; Dr. Ferdinand von Mueller, Melbourne, Australia; W. S. W. Ruschenberger, M.D., U.S.N., Philadelphia; Prof. Frédéric Schlagdenhauffen, Nancy, France; Prof. Dr. Ernst Albert Schmidt, Marburg, Germany; Prof. Dr. Junichiro Shimoyama, Tokio, Japan; Prof. Dr. Wilhelm Oswald Alexander Tschirch, Bern, Switzerland; Charles Umney, F.I.C., F.C.S., London, England; Prof. Dr. Emil Vogl, Vienna, Austria; Prof. Horatio C. Wood, M.D., Philadelphia.

On motion, the report was received, and the nominees were unanimously elected.

The same disposition was made of the following recommended in like manner for election as Corresponding Members of the College: Prof. Dr. Heinrich Beckurts, Braunschweig, Germany; F. Baden Benger, F.I.C., F.C.S., Manchester, England; Ernst Biltz, Erfurt, Germany; H. Bocquillon-Limousin, Paris, France; Prof. Dr. Albert Hilger, München, Germany; Prof. Dr. Theodor Husemann, Göttingen, Germany; Prof. Dr. Eduard Rudolf Kobert, Dorpat, Russia; Prof. Dr. Carl Liebermann, Charlottenburg, Germany; Karl F. Mandelin, Wasa, Finland, Russia; William Martindale, F.C.S., London, England; Helen Abbott Michael, Torwood, Isle of Wight; Chas. Theodor

Mohr, Mobile, Ala., U.S.A.; Prof. Louis Planchon, Montpellier, France; Jacobus Polak, Amsterdam, Holland; Prof. Dr. Th. Sandahl, Stockholm, Sweden; Prof. Dr. O. Schmiedeberg, Strassburg, Germany; Prof. Henry A. Tilden, Birmingham, England; Prof. Dr. Bernhard Tollens, Göttingen, Germany; L. Van Itallie, Rotterdam, Holland; Dr. G. Vulpus, Heidelberg, Germany; Prof. Dr. Otto Wallach, Göttingen, Germany; Dr. C. R. Alder Wright, F.R.S., London, England.

The following officers and trustees of the College were also elected by ballot :  
President—Charles Bullock.

First Vice-President—Robt. Shoemaker.

Second Vice-President—William J. Jenks.

Treasurer—William B. Webb.

Corresponding Secretary—Dr. A. W. Miller.

Recording Secretary—William B. Thompson.

Librarian—Thos. S. Wiegand.

Curator—Jos. W. England.

Committee on Publication—Henry A. Rittenhouse, Chas. Bullock, James T. Shinn, Thos. S. Wiegand and the Editor.

Editor—John M. Maisch.

Trustees for 3 years, next ensuing—T. Morris Perot, Jos. P. Remington, James T. Shinn.

On motion, meeting adjourned.

WILLIAM B. THOMPSON,  
*Secretary.*

## MINUTES OF THE PHARMACEUTICAL MEETING.

MARCH 21, 1893.

On motion of Dr. Lowe, Mr. Wm. McIntyre was called to the chair. The minutes of the last meeting were read and approved.

The registrar presented, on behalf of Mr. Hans M. Wilder, the following books for the library: Sternberg, Geo. M., Photo-micrographs and how to make them, 1883; Krukenberg, C. Fr. W., Medicinisch-chemische Analyse, 1884; Funke, Otto, Atlas der physiologischen Chemie, 1858; Pharmacopœia of the Hospital of the University of Pennsylvania, 1874; Official Formulæ of American Hospitals, 2d edition, 1886; Stammer, Karl, Chemische Rechnungsaufgaben, 1878; Warnecke, T. S., Supplementum Pharmacopœiæ Danicæ, 1869; New York and Brooklyn Formulary, 1884; Bruckner, W. H., American Manures, 1872; Mohr, Fr., Weinbau, 1865; Frickhinger, Albert, Katechismus der Stœchiometrie, 1865; Flückiger, F. A., Documente zur Geschichte der Pharmacie, 1876; Boeke, J. D., Sammlung stœchiometrischer Aufgaben, 1882; Icones plantarum. A rare book. Without title nor end, and with copious English manuscript notes. The handwriting is from the time of James the First. The book itself appears to be French.

On motion the registrar was directed to return the thanks of the College for this gift.

Dr. Lowe exhibited a *new form of still*, put on the market by Mr. Henry J. Maris; it consists of a rather flat copper vessel with a head attached by means of a slip joint, the head is conical and surrounded on the sides with a rim; the refrigeration is effected by a current of water which strikes the apex of the



cone and thus keeps, what otherwise would be the hottest point, cool; the material to be distilled is fed by a tube from a container supported above it, and another tube permits air to rise from the still head to the container until the lower surface of the tube is covered. It was asked if such a still was suitable for ethereal distillations as what is termed a water joint is not generally tight enough for such purpose; it was explained that in future a pair of flanges and gum washers clamped together would be used.

A *spatula of steel*, covered with hard rubber, was exhibited. A doubt was expressed as to whether the expansion of the two substances was not so different as to cause the rubber to break away from the steel. It was stated that great care should be taken for fear of such a flaw occurring and thus introducing a poisonous substance into some other mixture intended for quite a different purpose, as happened recently when veratrine, which was retained by a crevice in a mortar, was introduced into a mixture, although the mortar had been carefully washed with alcohol, and afterwards with a cloth and hot water; the proper method is never to use a mortar for such articles, and for remedies intended for internal use. The discussion brought out the better method of preparing veratrine ointment by mixing the alkaloid with either a small quantity of oil or glycerin.

Professor Trimble read a paper, prepared jointly by him and Mr. J. C. Peacock, upon *Canaigre tannin*—a product from *Rumex hymenosepalus*. In reply to various questions, Prof. Trimble said that Prof. C. B. Collingwood, of Arizona, has written somewhat about canaigre, and stated the yield in poor soil to be as much as seven tons to the acre, and when properly cultivated, twenty tons; a sandy soil seems to be best adapted to its growth. The tannin is precipitated by neutral salt; but this process is wasteful, as the tannin seems to be largely decomposed. It is intended to be used for dyeing purposes and not as a remedial agent. The crude drug has been used in the chipped state; it is peculiar in that the roots contain 18 to 20 per cent. of starch, and is, therefore, much more difficult to work with, but this has been overcome in some way by the manufacturers of the extract, which they keep to themselves.

Mr. England asked for the formula for *Pravaz's hemostatic Solution of Iron*. Prof. Maisch said that the strength of this solution was given in Dorvault's *L'Officine*; it consists of 26 per cent. of anhydrous ferric chloride and 74 per cent. of water, and has a density of 30° Beaumé.

Mr. England exhibited a mass of *hair* taken from the stomach of a cow. Butchers state that such things are quite often found, sometimes also associated with particles of gravel.

On motion, adjourned.

T. S. WIEGAND, Registrar.

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## EDITORIAL.

*Amendment to the Pennsylvania Pharmacy Law.*—In our two preceding issues, we have kept our readers advised of the progress made in the State Legislature, with the bill repealing Section 11 of the Pharmacy Law of 1887. We are pleased to state that the bill passed the Senate finally, March 9, by a vote of 35 and no negative votes, and that it became a law March 14, when

Governor Pattison promptly affixed his signature. The following is a copy of the law :

#### AN ACT

To repeal section eleven of an act entitled "An act to regulate the practice of pharmacy and sale of poisons, and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania," approved the twenty-fourth day of May, Anno Domini one thousand eight hundred and eighty-seven.

SECTION I. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same:* That section eleven of an Act entitled "An act to regulate the practice of pharmacy and sale of poisons and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania," approved the twenty-fourth day of May, Anno Domini one thousand eight hundred and eighty-seven, which reads as follows :

"Any graduate of an accredited medical college, who has had not less than three years' continuous practice since the date of his diploma, and who is registered as a practitioner of medicine and surgery under the act entitled 'An act to provide for the registration of all practitioners of medicine and surgery,' approved the eighth day of June, Anno Domini one thousand eight hundred and eighty-one, may be registered under this act without examination and be granted a certificate which shall entitle him to conduct and carry on the retail drug or apothecary business as proprietor or manager thereof, subject to fees provided in sections three and four of this act," be and the same is hereby repealed.

*The Kansas School of Pharmacy* has, since its establishment, been housed in the Chemistry Building of the State University, where it was insufficiently provided with room. When the last Legislature met, evidence was submitted showing the inadequate facilities for good work, and requests for a new building were made by the faculty of the school and by the druggists of the State. A bill was introduced into the House, appropriating \$20,000 for an addition to the building in which the school is now located; it passed the House with but little trouble, but when it reached the Senate the measure was promptly defeated, and thus the school continues to be crippled in its work, through a mistaken sense of economy on the part of the law-makers. The money granted to such an institution should not be regarded a gift, but properly used is a loan, that will be amply repaid and with interest by increasing the efficiency of pharmacists, whose standard of qualification cannot be raised too high, in view of the important relations to the public.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

### *Proceedings of State Pharmaceutical Associations:*

The following issues have been recently received :

*Indiana*.—Eleventh annual meeting, held in Indianapolis, May 11 and 12, 1892. Pp. 104. See July number, 1892, of this journal, p. 383. F. W. Meisner, Jr., La Porte, secretary.

*Iowa*.—Thirteenth annual meeting, at Davenport, June 14-16, 1892. Pp. 117. See our September number, p. 498. Dr. Rosa Upson, Marshalltown, permanent secretary.

*Michigan*.—Tenth annual meeting, at Grand Rapids, August 2-4, 1892. Pp. 88. See September number, p. 499. The next meeting will be held in June, at one of the resorts along the St. Clair River, the exact date and place to be announced later. Chas. W. Parsons, secretary. James Vernon, local secretary.

*Missouri*.—Fourteenth annual meeting, at Excelsior Springs, June 14-17, 1892. Pp. 167. See September number, p. 499. Next meeting at the same place, June 13-16, 1893. Dr. H. M. Whelpley, secretary; C. L. Cravens, Excelsior Springs, local secretary.

*North Dakota*.—Seventh annual meeting, at Fargo, August 2-4, 1892. Pp. 27. Also Report of the Secretary of the North Dakota State Board of Pharmacy. Pp. 18. A brief account of the meeting will be found on p. 547 of our last volume. Next meeting at Fargo, August 8-10, 1893. L. Christianson, secretary.

*Ohio*.—Fourteenth annual meeting, at Canton, June 14-16, 1892. Pp. 101. See July number, last volume, p. 384. As frontispiece the portraits of two deceased ex-presidents are published, J. F. Judge, formerly of Cincinnati, and I. N. Reed, late of Toledo. The next meeting is announced to be at Findlay, on the first Tuesday of May, 1893; J. C. Firnine, local secretary; Lewis C. Hopp, Cleveland, permanent secretary.

*Virginia*.—Eleventh annual meeting, at Petersburg, October 11-13, 1892. Pp. 104. The pamphlet has as frontispiece the portrait of Wm. A. Strother, a prominent druggist at Lynchburg, who died in that city August 1, last, in the sixtieth year of his age. The Association will hold its next meeting at Blue Ridge Springs, commencing September 12, next. The officers are F. W. Wills, Charlottesville, president; C. B. Fleet, Lynchburg, secretary; C. H. Lumsden, Lynchburg, treasurer; S. P. Christian, Jr., Roanoke, local secretary.

*Manuale di Chimica Tossicologica*, pel Professor Dioscoride Vitali, Professore di Chimica farmaceutica e tossicologica nella R. Università di Bologna. Milano: Tipografia del Riformatorio Patronato. 1893. 8vo. Pp. 524.

Manual of toxicological chemistry.

In the preliminary portion to this work the author gives upon more than two closely printed pages the titles of works, monographs and periodicals consulted by him, showing that he has endeavored to avail himself of the researches of all civilized countries. The prefatory chapter explains the object of the work and shows the importance of toxicology as a science, related to therapeutics, physiology and pathological anatomy, as well as to analytical chemistry, of which chemical toxicology forms a most important branch, to which this manual is especially devoted. The work proper is divided into four parts, of which the first treats of poisons in general, their absorption, the changes they undergo in the body, their localization and elimination, first aids in cases of poisoning, the chemical antidotes, the duties of the chemical expert under the laws of Italy, and the classification of the poisons into groups, according to their toxic action. The second part is taken up with the metallic poisons, arsenic, antimony, tin, copper, lead, zinc, mercury and silver,



the largest space, about 27 pages, being required for the arsenical compounds. From French statistics quoted by the author it is of interest to note that during the three decades commencing 1845, not only has the total number of cases of poisoning decreased, but the proportion of arsenical poisoning has decreased to a still greater extent, showing that other agents are now more largely made use of, proportionately, for the destruction of human life. During the three decades the cases of arsenical poisoning were 68.5, 27.7 and 18.5 per cent., respectively, as compared with the total number. Part III discusses in two sections the poisonous gases ( $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{SO}_2$ ,  $\text{Cl}$ ,  $\text{HCl}$ ,  $\text{NH}_3$  and allied compounds) and volatile elements and compounds, like bromine, iodine, cyanides, chloroform, chloral, benzol, phosphorus, the mineral acids, etc. In Part IV, we find in the first section the common organic acids considered, together with the caustic fixed alkalies and their compounds and barium, while the second section is reserved for other, mostly non-volatile organic compounds, among which there are many that are not likely to be used for criminal poisoning, such as nitroglycerin, resorcin, santonin, cantharidin, picrotoxin, digitalin, helleborein, saponin, aloin, colocynthin and the resins of jalap and scammony. This second section closes with the most important portion of the work which, in over two hundred pages, is devoted to the alkaloids, of which about one-sixth is occupied by general considerations, the toxic action, absorption, diffusion, localization and elimination; the difficulties encountered by the toxicological chemist; the physico-chemical characters of the alkaloids; the group reagents, color reactions, micro-chemical recognition and the isolation of the alkaloids from the material and their quantitative determination. In the special part we meet with a large number of alkaloids, embracing not only those usually recognized by the pharmacopœias, but also such as are rather rarely seen and not frequently used in medicine, like lobeline, quebrachine, gelsemine, the pomegranate alkaloids, taxine, ergot constituents, muscarine and poisonous fungi, the artificial alkaloids (aniline, kairine, thal-line, antipyrine), and finally the ptomaines. An appendix contains descriptions of the processes recommended by different authors, for the isolation of poisons, when the nature of the latter is not known; also some additions to various chapters, which became known while the work passed through the press, among them a process elaborated by Prof. Vitali, for the quantitative determination of small quantities of arsenic.

It will be seen from the foregoing that Prof. Vitali's manual covers the ground of toxicological chemistry very thoroughly, and more comprehensively than is done by other similar works. In his endeavor to give the latest information, the author has not only availed himself of the literature of the different countries, but has also made many experiments and researches, the results of which are scattered through the work. A comprehensive and reliable work is thus produced, which will be consulted with profit by those interested in the important subject of which it deals.

*Further Studies of Yuccas and their publication.* By Wm. Trelease. Pp. 46.

A continuation of the author's work, noticed in our preceding volume. The essay is a reprint from the fourth annual report of the Missouri Botanical Garden, and is illustrated by 23 plates, mostly phototypes of different species of *Yucca* and fruit.



## OBITUARY.

*Francis Wolle*, a Moravian minister and educator, died at Bethlehem, Pa., February 10, aged 75 years. He was born at Nazareth, Pa., and educated at Nazareth Hall and at Bethlehem. He was the originator of a machine for the manufacture of paper bags, first patented in 1852, and for twenty years was principal of the Moravian seminary for young ladies at Bethlehem. His love for natural history led him finally to the study of low vegetable organisms, resulting in the publication, since 1884, of four large illustrated volumes on desmids, fresh water algæ and diatomaceæ, which established his reputation as a scientist and as an authority in this special field.

*George Vasey*, M.D., botanist at the Department of Agriculture, died in Washington, D. C., March 4, at the age of seventy-one years, of constriction of the bowels. Born at Scarborough, Yorkshire, England, February 28, 1822, he came with his parents to America, when a child, received his medical education at the Berkshire Medical College, Pittsfield, Mass., where he graduated in 1848, and afterward practised medicine in Illinois, until in April, 1872, he was appointed botanist to the Department of Agriculture at the seat of the National Government. The accumulation and arrangement of the National herbarium, comprising over 25,000 species of plant, is largely due to his untiring efforts. His chief work was upon grasses, with the purpose, as he stated in his annual report for 1886, "of bringing to view and into cultivation new kinds which might prove useful additions to the agriculture of the country. . . . In a country so extensive as ours, embracing such a variety of soil, surface and climate, it cannot be expected that any one kind of grass will be adapted to cultivation in all situations. . . . Particularly in the arid regions of the West new kinds of grasses are needed, adapted to the peculiar conditions there existing." A number of botanical pamphlets and monographs, of which he was the author, or which were prepared under his supervision, have been issued by the Department, and several were noticed in previous volumes of this journal.

*Carl Prantl*, professor of botany at the University of Breslau, died February 24, after prolonged illness, of pulmonary disease. He was born September 10, 1849, in Munich, where his father was professor at the University, and where he received his scientific education, and graduated after especially studying botany under Professors Naegeli and Radlkofer. In 1870, his essay on "inulin, a contribution to vegetable physiology," was awarded the prize of the philosophic faculty of the University named. In 1873, he became connected, as private lecturer, with the University of Wurzburg, and in the following year published his manual on Botany, of which the eighth edition appeared in 1891. He accepted, in 1876, a call as professor of botany to the College of Forestry at Aschaffenburg, and in 1890 succeeded Engler at Breslau. A Flora of Bavaria was published by him in 1884, and he was the author of numerous essays, relating to morphological, physiological and systematic botany; perhaps his most important literary labor was in connection with "Natürliche Pflanzenfamilien" (natural plant families), of which he was the joint editor, with his friend Engler, and for which he elaborated several phænogamous orders; the text for the cryptogams, and more particularly for the ferns, which

Prantl had specially reserved for himself, remains unfinished, in consequence of his untimely death at the age of forty-three years.

*Rudolf John Christian Brunnengraeber* died at Rostock, Germany, February 19, in the sixty-first year of his age. He was born in Schwerin, May 19, 1832, and after attending there the classical school (Gymnasium) until 1849, became an apprentice in pharmacy in Berlin, where he subsequently continued his studies at the University to prepare for the State's examination, which he passed at the University of Rostock, at which institution he afterward, in 1862, graduated as Ph.D. In the same city he became the proprietor of a pharmacy in 1859 and combined with the business the manufacture of various chemicals. He took a most prominent part in pharmaceutical affairs in Germany and in the welfare of the National Apothecaries' Society, of which he became one of the directors in 1869 and continued in that position until the time of his death, serving as president from 1878 until 1891. For thirteen years he was a member of the Board of Health of the German empire, and he served in many other positions of honor, trust and responsibility. He was first vice-president at the fifth International Pharmaceutical Congress, held in London in 1881, and in the following year he was elected an honorary member of the American Pharmaceutical Association.

*Isaac J. Martin*, Ph.G., M.D., died at Ellicott City, Md., December 15, 1892, in the seventy-eighth year of his age. He was born of Quaker parents at Port Elizabeth, N. J., September 15, 1815, and after the death of his parents was raised by relatives in Philadelphia. In 1832, he was apprenticed to Edward B. Garri-gues, then in business at Sixth and Spring Garden Streets. He graduated from the Philadelphia College of Pharmacy in 1835, and took his preceptor's store in 1837. Owing to poor health he moved to Maryland in 1841, conducted for some time a seminary in Harford County, studied medicine, and in 1849 located at Ellicott's Mills, now Ellicott City, where for a short time he taught school, but in 1850 opened the drug store with which he was connected to the time of his death, and which is now conducted by his sons. Dr. Martin, in 1843, became a member of the Methodist Episcopal Church, and several years later was licensed to preach.

*James C. Craven* died at his home in Philadelphia, March 25, after a long illness. He was born and educated in Philadelphia, learned the drug business with Bullock & Crenshaw, and graduated in pharmacy in 1869. He then determined to prepare himself for the ministry, studied at the University of Pennsylvania and at the Protestant Episcopal Divinity School, and was ordained in 1875. Subsequently he was called to rectorships of churches in Providence, R. I., Dubuque, Ia., and Jenkintown, Pa., resigning the latter position last August on account of his health.

*Isaac Tull*, a native of Philadelphia, graduated in pharmacy in 1872, and afterward conducted a store at Fortieth and Locust Streets. Some years ago he removed to Morgantown, N. C., where he carried on the drug and apothecary business until the time of his death, which took place, of meningitis, December 22, 1892, the deceased being in the forty-second year of his age.

# THE AMERICAN JOURNAL OF PHARMACY.

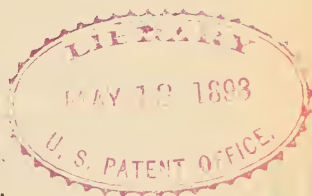
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MAY, 1893.

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## LAUDANUM ASSAY.

BY LYMAN F. KEBLER, PH.C., B.S.



In an article<sup>1</sup> on this subject, by Mr. F. X. Moerk, it was stated that objections were frequently made to the pharmacopœial method on account of its general non-applicability to the various opium preparations. Vital as this is, yet there confronts those of us who are required to assay the various opium preparations for final standardizing a greater difficulty.

The general testimony of different workers<sup>2</sup> is that the U. S. P. method is from .8 to 2 per cent. below the truth. The process above referred to is a modification of the U. S. P. process, but does not provide any remedy for the low results. The questions arise, shall or can we use the U. S. P. method for standardizing our opium preparations in these days of competition, or shall we use a method that gives higher results and is nearer the truth? Fortunately for us, unfortunately for the practitioner and the consumer, the legally recognized authority does not require us to standardize the finished products of opium, only the initial opium requires this.

Take for example a practical case: required to standardize 20 gallons of laudanum so that each ounce shall contain 6 grains of morphine. Assay by U. S. P. method, modified by Mr. Moerk, gives 1.28 per cent. Assay by a modification of Dr. Squibb's process gives 1.455 per cent. In the first case we are compelled to evaporate 5 pints and 10 ounces in order to secure the desired

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<sup>1</sup> 1892, Am. J. Phar., 64, 354.

<sup>2</sup> 1888, Ephemeris, 3, 1113-1128.

standard and obtain only 19 gallons 2 pints and 6 ounces of finished product. According to the second assay it is only necessary to add 2 gallons of the proper menstruum and we have 22 gallons of finished product, a difference of 2 gallons 5 pints and 10 ounces, according to the process employed. With laudanum at \$6 per gallon we would receive \$16.20 more or less, according to the process employed, for the same product.

The process naturally chosen by the manufacturer is the one that yields the best returns on the money invested, both being legitimate.

The writer has, for some time, used a modification of Dr. Squibb's process<sup>1</sup> (which is principally a modification of Prof. F. A. Flückiger's original<sup>2</sup> design and plan) and this has given him more satisfactory results, with less attention, than any other method in literature tried by him.

For example, quadruple assays of a sample of laudanum, prepared according to the U. S. P. formula, gave the following results :

1	2	3	4	Mean.
1'20 p.c.	1'19 p.c.	1'16 p.c.	1'22 p.c.	1'192 p.c.

Again, a sample of tincture of opium, prepared approximately and subsequently standardized by assay in quadruples, gave the following data :

1	2	3	4	Mean.
1'405 p.c.	1'305 p.c.	1'360 p.c.	1'345 p.c.	1'354 p.c.

The purity of the crystallized morphine was verified by testing a small portion with lime water, in which the alkaloid is completely soluble while the foreign matter is insoluble and subsides to the bottom of the containing vessel when set aside a few minutes ; if more than a perceptible residue remained, the percentage of insoluble matter was estimated according to Dr. Squibb's outlines.<sup>3</sup> "·5 gram is weighed off, put into a graduated cylinder and 50 cc. of lime water is added, by pouring down the side of the inclined cylinder. The contents of the cylinder are then tilted backward and forward without shaking, so as to avoid the formation of froth

<sup>1</sup> 1889, *Ephemeris*, **3**, 1150-1164.

<sup>2</sup> 1879, *Pharm. Zeitung*, 431 ; *Abstr.*, 1882, *Ephemeris*, **1**, 10, modified 1885, *Arch. der Pharm.* (3), **26**, 254 and 289.

<sup>3</sup> *Ephemeris*, **3**, 1158.



on the surface, until all that is soluble is dissolved. The solution is then filtered through a pair of counter-balanced filters about 7 cm. or 2.8 inches in diameter, the filters and residue are well washed first with 5 cc. of lime water and then with 5 cc. of water, and when drained they are closed up, pressed between folds of bibulous paper, dried until they cease to lose weight at 100° C., and weighed." From these data we can easily calculate the percentage of insoluble matter.

The method used by the writer for laudanum assay is as follows: Place 100 cc. of the laudanum to be assayed into a tared capsule of about 250 cc. capacity, evaporate on the water-bath, occasionally stirring, until the contents of the capsule weighs about 20 gm., while yet warm add 80 cc. of cool distilled water slowly, stirring constantly. Allow the capsule and contents to stand until cool and the insoluble matter has completely subsided, then pour the clear liquid on a well-wetted filter of about 9 cm. diameter so folded that the lower part of the cone shall hang free from the sides of the funnel. The filtrate is received into a beaker marked at 135 cc. After the liquid has all been poured out of the capsule about 10 cc. of water are added and the residue removed from the sides and bottom of the capsule by means of a rubber tipped stirring rod and transferred to the filter, two similar subsequent treatments should suffice to remove everything from the capsule to the filter. If filtering is begun before the insoluble matter has subsided, it will be very tedious and unsatisfactory, for some of the finer particles are not retained by the filter until it is clogged. Wash the residue on the filter well with small portions of water, allowing each portion to drain completely before a subsequent addition is made, until the residue is exhausted and the filtrate measures about 135 cc. Place the filtrate into a tared capsule of about 250 cc. capacity and evaporate on the water-bath, stirring occasionally, until the filtrate is reduced to 14 gm.; while yet warm pour into a tared flask of 100 cc. capacity. The portion remaining in the capsule is transferred to the flask by successive rinsings of about 2 cc. of water and finally enough water is added to make the solution weigh 20 gm. The precipitating, separating, washing and drying is executed as is outlined in the Ephemeris except that the morphine is more thoroughly washed with water, so that the mother liquor and the washings measure 65 cc. instead of 50 cc.

It would be well, perhaps, to give verbatim the principal parts of the original article on "Precipitation," and "Separation and Washing," so as to make the process complete here.

*"Precipitation.*—To the 20 grams of concentrated solution is then added half its weight, or 10 grams of alcohol of not less than 91 p.c., s.g. .815, and the mixture is well shaken. Then 25 cc. or 17.5 grams of ether<sup>1</sup> not less than 93 p.c., s.g. .725, is added, and the mixture again well shaken. To this 3.5 grams or 3.5 cc. of water of ammonia of 10 p.c. strength, s.g. .960, is added, and the mixture is vigorously shaken for 10 minutes." "At the end of the 10 minutes' shaking, the flask is set aside overnight, or for not less than 6 hours."

*"Separation and Washing.*—The ether layer is poured off as closely as possible, and 20 cc. of fresh ether is added to the contents of the flask, and rinsed round without shaking. This is poured off as closely as possible, and 20 cc. more of fresh ether added, rinsed round and poured off as before, and this is repeated with a third portion of 20 cc. of fresh ether. A pair of counter-balanced filters 9 cm. or 3.6 inches in diameter, folded at an angle slightly wider than the funnel, and well wetted with ether, then receive the contents of the flask, the upper ether layer being slowly poured in first, so that it may pass through before the paper becomes wetted with the watery solution. When the liquid has nearly drained through from the crystals on the filters, those from the flask are washed out onto the filters by repeated portions of water, about 3 cc. at a time, until all the crystals are on the filters. Then water is applied, drop by drop, from a pipette held 3 or 4 inches above the funnel, to the edges of the filters and surface of the crystals, until they are fairly clean, and the mother liquor and washings together do not exceed 50 cc. Then 5 cc. of a saturated solution of morphine in 91 per cent. alcohol is dropped from a pipette, first upon the crystals on the point of the filters and then upon the edges of the filters, so as to displace all the watery solution and leave them saturated with the alcoholic liquid. Then before this has time to dry, it is displaced by dropping on, in the same way, 5 cc. or more of ether. When this has drained through, the filters are closed together upon

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<sup>1</sup> Prollius was the first to use ether for this purpose, 1877, Schweiz. Wochens. f. Pharm., 381; Pharm. Zeitung; Dragendorff's Jahresberichte.

the crystals, in the original folds, and pressed between folds of bibulous paper, under weights, for half an hour. The filters are then opened, and when the morphine is spread out upon the inner one, they are dried at 60° C. or 140° F. until they cease to lose weight. This is the crude morphine, and if a small portion of it is found to be entirely and quickly soluble in one hundred times (or more) its weight of lime water, the weight of the morphine multiplied by 10 is accepted as the percentage of morphine yielded by the laudanum."—Laboratory Smith, Kline & French Company, Philadelphia.

## ON THE PREPARATION OF COMPRESSED TABLETS. 1

By J. A. McFERRAN, M.D.

Read at the Pharmaceutical Meeting, Philadelphia College of Pharmacy, April 25.

Prescriptions are a matter of confidence between the druggist and physician, and no measure of compliments can do away with the responsibilities of either toward the sick. Both should be thoroughly competent to do their duties in a practical way. Neither can delegate to others any part of their duties; both have noble callings, and there should be as much conscience on the part of the compounder of medicines as on that of the prescriber. Medicines are, to a large extent, the means used by the physician to meet the onset of disease. The physician chooses the remedies and trusts to the druggist to prepare them. In these progressive times the physician too often forgets the great purposes of his profession by giving importance to manufacturers' compounds; and the druggist eager for trade lowers himself to localized venders of ready-made prescriptions. This state of affairs, the druggist says, has been brought by the physician; and the doctor says the fault rests with the druggist in not keeping up with the demands of practical pharmacy. I think the trouble is somewhat with both; the doctor is often too indolent to think, and the druggist too lazy to work. The doctor prescribes pills of valerianate of zinc, granules of strychnine, elixir of quinine, iron and strychnine, and an innumerable multitude of other ready-made compounds. The druggist buys his extracts, tinctures, confections, and pills, and lozenges, from the manufacturing chemist, labels them with his own label, and calls his place a pharmacy. In neither case is the patient getting what he pays for, the best thought of his physician or medicine compounded by the

druggist, in whose skill he places his health's safety. I am free to say, I have no faith in the skill of the doctor who prefers the prescriptions of others to his own ; or in the ability of the druggist who depends upon others for the products that legitimately belong to his pharmaceutical calling.

There is one form in which medicine is very frequently used at the present time, that gives the retail druggist ample opportunity to show his individual skill and meet the many demands of his customers without resorting to the products of others : I mean compressed tablets.

The enterprising manufacturers not only will furnish them direct to the physician, but will solicit orders also from the druggist. No pent-up Utica is theirs, the whole boundless domain of physics is embraced in their all-absorbing love. Nor will the doctor, prone to the easy paths in the practice of medicine, stop his ears to the seductive arguments of the travelling salesman. The manufacturer sees the opening for trade, the retail druggist tries to ignore it ; but it is useless ; the doctors want compressed goods, and if they cannot get them from the retail druggist first-handed, they will get them where they can. It is useless to say that they are not used, or that they cannot be made by the retail druggist. They are used, and the retail druggist can furnish them in a better condition for administration than is often done by the manufacturer. The druggist can fill a doctor's *own* prescription, leaving the doctor no excuse for using that of others. He can make them hard or pliable, to suit the wants of the physician. By this means, the patient, the doctor and the druggist are brought nearer together, between whom there should be mutual confidence. It is urged by many druggists that they can buy tablets at a lower price than they can make them. This is not so for goods of the best quality ; further, there are some compressed goods which are popular as domestic remedies, which change in appearance by keeping long, if made properly. For instance, soda mint tablets, such as are usually put on the market, if they have the full amount of oil in them and ammonia they will turn yellow ; if they have not they are of but little use, and the buyer is disappointed or cheated. A druggist could make up a small quantity at a time and have them *fresh* ; customers always want things fresh.

*Soda mint* is very easily made. Mix 1 lb. of bicarbonate of soda, gum arabic 1 ounce, oil of peppermint ʒiii, and carbonate of



ammonia  $\mathfrak{z}i$ ; dampen with alcohol and water, run through a No. XX sieve and dry. Make into 5-grain tablets, and sell them to your customers as the best in the market; for they are of your own make. These will be what they profess to be, and your patrons will soon find it out.

If you understand the principles of pharmacy, you can soon learn how to make compressed tablets, and learning how, you will become better druggists. Of course, as graduates you know the chemical relation of drugs, how and when chemical reactions take place; this will serve a good purpose here. For some time past there have been used many tablets of calomel and bicarbonate of soda. Your chemistry will tell you if these salts be mixed wet, and granulated, decomposition will take place, and the question would be, how to avoid it? You might do so in several ways; but I will mention only one. Take bicarbonate of soda  $\mathfrak{z}xss$ , gum arabic  $\mathfrak{z}ss$ , mix and dampen with water, run through a No. 40 sieve, dry and put into a bottle, add calomel  $\mathfrak{z}iss$ , and shake this until every granule is coated. The calomel will adhere to the small particles of soda hardened with the gum; this will obviate any necessity of talc. The object is to prevent the soda and calomel coming together in a damp condition. Make up into one-grain tablets, each of which will contain  $\frac{1}{12}$  of a grain of calomel. This illustrates pretty well how chemical incompatibles may be put together in a compressed form and still retain their individuality, and still better how, in some cases, a dangerous result may be avoided from mixing together articles innocent in themselves, but deleterious as factors in a product. The soda hardened with the gum is scarcely, in the least, hygroscopic and the tablets made with it, in the manner stated, will keep without change fully as long as a druggist who has them for sale desires. The calomel, being put in last, answers the purpose of its indications as a medicine, and, at the same time as a protection against adhesion to the dies and punches. In all these combinations a certain amount of brains is a *sine qua non*, and may be written on the formula *quantum sufficit*. Here, as elsewhere, the dictum of the teacher cannot give individual skill, nor can the dreams of theory take the place of applied knowledge.

At the start remember, and never let it be forgotten, that facts established cannot be changed, and it is with facts you have to deal. The metal of which the dies and punches are made is a fixed,

unalterable fact. You may change the form, the peculiar construction of the punches or die; but so long as the face of them presents a smooth surface to the material to be compressed, it is always the same. Remembering this, you will not ascribe the fault to the die or punch, if your material adheres to them. The punch should be perfectly smooth and have sharp edges, and move freely in the dies. They should be made of tool steel and tempered just hard enough to prevent bending under pressure—beyond this you should expect nothing, and if the material adheres to them, you must look to the material as the thing at fault. As a rule, you should cause the cohesive property of the material to be greater than the adhesive, and when, by experiment, you find where the fault is, all that you have to do is to apply your knowledge of the nature of the different excipients to correct it. There are some materials that are neither cohesive nor adhesive; for instance, if an ounce of pulverized charcoal were ordered to be made into 40 lozenges, you would have no trouble in their sticking to the dies and punches, but you would have a great deal in getting any cohesion between the different particles of the material. The question here would be to add something that would cause a cohesion greater than adhesion, and, at the same time, not destroy the effect of the charcoal as a remedy. Here dextrin, wax, gelatin, gum arabic and tragacanth, mastich, etc., present themselves, as the different particles of the charcoal must actually be glued together.

If you were ordered to make 480 grains of salicylate of soda into 96 tablets, you might add some pulv. acacia, dampen with alcohol and water, run through a No. XXX sieve and dry. Just before using, stir in some talc to prevent sticking. There are other ways, without the use of talc, but it is better to learn this way first.

The coal oil products will claim your attention very often. Most of them are not soluble in water, and when pressed alone may prove useless on account of their insolubility. A small quantity of starch added to the mixture may often become of great service. Say you take salol, phenacetin, starch; dampen with alcohol, run through a No. XX sieve, shake over a gas jet to slightly warm, to granulate and dry; a moderate heat assists in granulating. There is no need of anything to prevent sticking.

There is a point that it is well to remember: Any liquid that is not a solvent to any of the ingredients in a compound, will act as a

protection against adhesion to the dies. In the manufacture of refined naphthalin into tablets, the material will stick to the dies if something is not used to prevent. As naphthalin is not soluble in water, water should be used to dampen, and this is effectual against adhesion.

In making tablet triturates, you will find sugar of milk alone makes the tablets too brittle ; to correct this, add about one part in 8 of cane sugar as the base, dampen with alcohol and make up damp, unless they contain extracts ; in that case you would have to make up dry and use talc to prevent sticking. The talc should always be stirred in after the material has been granulated and dried. Where talc is objectionable, white cosmoline or albolin can be used pretty freely, if you have a machine that will feed a damp and sluggish material. By putting the tablets into some absorbent powder after they are made and applying heat, most of it will disappear.

Learn the nature of each article that you wish to compress, and take advantage of your knowledge of the solubility in different menstrea, and when the contrary nature of the different articles in a combination precludes the use of this knowledge, fall back upon such correctives as experience and your own thoughts suggest to meet the particular case. In making up compounds, reduce all to a fine powder as far as practicable ; in this way you will make more regular granulations and finer looking tablets. Take the familiar brown mixture: Gum and licorice, each 2 lbs.; opium, 219 grs.; benzoic acid, 219 grs.; camphor, 140 grs.; oil of anise, 219 grs.; tartar emetic, 110 grs.; nitrate of potash, 1,750 grs.; sugar, sufficient for 10 lbs. If these be thoroughly mixed and ground to a fine powder, put into a wide receiver, and hang a wet sponge to the under side of a lid ; the material will absorb enough moisture to dampen during one night ; next morning run through a No. XXX sieve and dry ; on account of the extracts and sugar you cannot do without talc or lycopodium to prevent sticking. If you prefer, you can use diluted alcohol and dampen with a hand atomizer.

In filling prescriptions of small quantities, there is often no need of elaborate work in granulating ; sometimes, when not incompatible powdered soap rubbed up with the articles ordered prepares them to be run through a sieve ; simply dampening with ether, puts a powder into a granular condition. And where running out a

pound might require something to prevent sticking, 10 to 20 tablets would require nothing. Wetting with alcohol and drying will almost always leave the mass grainy. It does not matter how fine your material is, all you want is that it will tumble and not hold together on account of the moisture in it. I might talk for a week about material; but I wish to say something about how to make the tablets.

In the first place, do not get the fidgets, see that everything is in place and that your machine is clean. Choose the set of dies required; and in this machine designed especially for retail druggists, you will find by lifting a small shaft and removing a pin, you can take off the feeder. Turning a few turns on this thumb screw you can pull out the die holder; while this is out you can see if the internal part of the machine is clean. The die holder being out, put in a top punch of the size you wish, put the die into the die holder, insert the bottom punch, put in the die holder with its containing die and punch, fasten into place by turning thumb screw, slip on the feeder, drop the small vertical shaft into place, and you are ready for work. Weigh out the quantity of one tablet, pour it into the die and screw up the bottom punch until the material comes even with the plate. Turn on the pressure, and when the top punch is at its lowest depth, turn the knob at the top of the eccentric strap until you feel the pressure. Make 2 or 3 tablets to see whether the weight is all right, then put on more pressure if necessary and finish your work. The first tablets should not be pressed much; when you are sure of your weight, you can powder the trial ones between your fingers and return to the feeder. The small cup should be used in making up small quantities. Put it in by taking off the top of the feeder and simply putting the cup in its place; the motion of the feeder, in going backward and forward, will cause the material to drop into the die; the remnant of one or two tablets can be brushed into the die and there is no need of wasting any material at all. The feeder is so constructed that there can be no leakage from beneath the feed. The lower punch is so constructed that there is the least amount of friction possible. One great fault in making tablets is in using too much pressure, running at the rate of 60 per minute, the pressure should scarcely be felt on small tablets; but by taking a tablet between the fingers a little experience will tell you whether to put on or take off pressure,



which is easily done by simply turning the knob to the right or left. In making tablets, whenever you hear a rubbing sound when the tablet is ejected you may know that the material needs correcting. As the feeder is so easily taken off, you can remove it with its contents without wasting a particle, correct the material by adding talc, or what else is needed; put it back and proceed. Do not undertake to make tablets too fast; a regular easy motion is the best, and you will accomplish more than by trying to do a great deal in a short time. I am sure this machine will do all that is required by a retail druggist, as well as it is possible for a machine to do it. It is strong, it takes up but little room, is easily kept clean and it is so simple that any one can understand it and run it. You can make quinine tablets, hypodermic tablets and such things as you wish to avoid excipients in; besides, by the constriction of the feeder you can make up the flat friable triturates faster and more regular than on plates, and that too without the use of talc or other insoluble excipients. The how to do those things does not properly belong to a short talk on tablets; any one wishing to learn can do so on a proper occasion.

Here are quinine tablets, made without gum, oil, starch or talc and other tablets of different sizes and shapes, made on a machine similar to this, which should be evidence conclusive that a retail druggist can make his own tablets and furnish physicians, who desire to think for themselves, any tablet that they wish to prescribe, without buying a hundred to fill a prescription of ten.

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## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*A test for cineol (eugenol)*, suitable for its detection in volatile oils, was discovered by E. Hirschsohn in determining the solubility of iodol in volatile oils; it was noticed that iodol was much more soluble in some oils than in others, and that in some oils a crystalline deposit was obtained in varying periods of time (one minute to twenty-four hours). The oils first giving the test contain cineol as the chief constituent, according to the investigations of Wallach; this was confirmed by using chemically pure cineol when the same compound was produced; after pouring off the excessive oil from the crystals, the latter were thoroughly washed with petroleum-

ether, when a grayish green crystalline, odorless substance was obtained, rather soluble in alcohol (95 per cent.) and ether, but difficultly soluble in chloroform and benzol; the crystals boiled with aqueous alkaline hydrates were decomposed, giving the characteristic odor of cineol. This test is serviceable in the examination of mixtures containing hydrocarbons, like oil of turpentine; to dissolve one gram iodol, 100 cc. of turpentine oil are required; the addition of 5 per cent. cineol to the oil enables 58 cc. to dissolve the iodol, crystals separating after twenty-four hours' standing; if 10 per cent. cineol be present 48 cc. will be required, crystals separating after three hours. In applying the test from 3-15 drops of the oil were agitated with 0.01-0.05 gm. iodol. If necessary, more of the oil was added drop by drop until perfect solution resulted; the test was then set aside and examined frequently during twenty-four hours to see if crystals had separated, these then were tested for cineol by heating with potassium or sodium hydrate solution and noting the odor. All samples of the following oils readily gave the test: *Santonica*, *hyssop*, *Kuro-moji*, *laurel*, *lavandula vera*, *lavandula Spica*, *rosemary* and *sage*; in the following oils some anomalies are to be noted: *Absinth*, of German, French, Russian and American samples, only those of the first origin gave the test; *eucalyptus*, of a large number of samples examined only three failed to respond; *galangal*, two of three samples responded; *millefolium*, some Russian and German samples gave the test, but not uniformly; *origanum*, three of four samples yielded affirmative tests; *savory*, only one out of four samples responded; *wild thyme*, four of eight samples gave the test. By distilling the following oils (which themselves did not respond) with steam and applying the test to the first portions of the distillate the test was also obtained: *Basil*, *Mentha crispa* and *M. piperita* from all sources. This modification of the test may detect cineol in oils which directly tested will not respond; the nature of the crystalline compound has not as yet been ascertained.—Pharm. Ztschr. f. Russl., 1893, Nos. 4 and 5.

*Syrup of Iodide of Iron*, if made from sugar containing ultramarine, will uniformly assume the red color which has so frequently been commented upon; this coloration was never observed when rock candy was used in the preparation of the syrup.—J. Martenson (Pharm. Ztsch. f. Russl.), 1893, 100.

*Hydrargyrum sozoiodolicum* is recommended to be dissolved in

potassium iodide solution for hypodermic injections. F. Riederer always noticed a dark gray residue when making up the solution; this residue, amounting to about 0.5 per cent., was found to consist largely of metallic mercury, while the solution contained some red iodide of mercury. From this it is evident that potassium iodide solution cannot be used for the dissolving of the mercurial salt without decomposition.—Pharm. Ztsch. f. Russl., 1893, 101.

*The use of crude carbolic acid and wood-tar*, for disinfecting purposes, is rather wasteful because of their insolubility in water. E. Hirschsohn, in a series of experiments, found that if 100 parts of so-called 100 per cent. crude carbolic acid was agitated with 50 parts moderately finely powdered rosin and 6–8 parts sodium hydrate dissolved in 12–16 parts of water until solution resulted, a liquid was obtained giving an almost clear solution with ten volumes of water. The solution resembles “Lysol,” differing from it, however, in not being miscible with petroleum-ether, and in not producing the gelatinous mass upon addition of two or three volumes of water. Experiments with so-called 50 per cent. crude carbolic acid did not give a preparation dissolving perfectly in water; using the same proportions as above, the preparation resembled “creolin,” giving with water an emulsion.

In experimenting with wood-tar it was found that the same formula would not give satisfactory preparations with the different kinds of tar. While in the case of birch-tar the above proportions proved satisfactory, fir-tar required an entirely different formula. The best results were obtained by using 100 parts of fir-tar, 10 parts rosin and 6–7.5 parts sodium hydrate, dissolved in 12–15 parts of water. These preparations do not give entirely clear dilutions with water, but upon prolonged standing neither an oily nor tarry layer separates.

While heat is not essential for success it facilitates the solution of the rosin in the carbolic acid and tar; the sodium hydrate, however, must be dissolved in the specified quantities of water or inferior preparations will result. Attention is called to the fact that crude carbolic acid is met with which will give good preparations with less rosin and sodium hydrate. Other oils, like oil of turpentine and oil of eucalyptus, can be made miscible by following the above directions.—Pharm. Ztschr. f. Russl., 1893, Nos. 8 and 9.

*Caffeine salts.*—By direct combination with the acids, and drying

over quicklime or sulphuric acid, the following salts were made: *Nitrate*  $C_8H_{10}N_4O_2HNO_3$ ; *acetate*  $C_8H_{10}N_4O_2(HC_2H_3O_2)_2$ ; *propionate*  $C_8H_{10}N_4O_2(HC_3H_5O_2)_2$ ; *citrate*  $C_8H_{10}N_4O_2(H_3C_6H_5O_7)$  (this compound at  $100^\circ C$ . loses no weight, is soluble in a mixture of chloroform and alcohol and the alcoholic solution does not at once redden blue litmus paper. A mixture of caffeine and citric acid in molecular proportion at  $100^\circ C$ . loses about 8 per cent. water of crystallization, while it is soluble in a mixture of chloroform and alcohol, the alcoholic solution reacted acid at once). The *formate*, *butyrate* and *valerianate* could not be obtained containing the theoretical quantities of acid. The *acid sulphate*  $C_8H_{10}N_4H_2SO_4$  was readily obtained from the alkaloid and sulphuric acid in alcoholic solution; exposed to the air for a few days the salt takes up one molecule of water. The *neutral sulphate* could not be obtained pure.—Prof. E. Schmidt and Dr. R. Gaze, *Arch. der Pharm.*, 1893, 1–10.

*Cerbera Odallum* Gærtn.—A supply of seed kernels from the Dutch Indies furnished the material for the following investigation: They contained 6.94 per cent. moisture, 2.41 per cent. ash, and by extraction with ether about 77 per cent. fat; by expression with moderate heating about 44 per cent. could be obtained. The active constituent, cerberin, was isolated by first expressing as much as possible of the oil, digesting with several portions of 80 per cent. alcohol, distilling off the alcohol, adding water, separating the fat collecting upon the surface and repeatedly agitating the solution with petroleum ether. After standing for some time, a black layer subsided which was separated from the supernatant liquid, washed with petroleum ether, dissolved in alcohol and filtered through purified animal charcoal; by repeated crystallization from alcohol and washing with ether, perfectly white crystalline cerberin was obtained. By this washing with ether a substance was removed melting at  $175$ – $176^\circ C$ . The yield of cerberin in the first lot extracted was 0.16 per cent., while later only 0.08 per cent. was realized. The kernels had between the two operations become perfectly black, so that partial decomposition of the cerberin is very probable. Cerberin forms colorless, odorless, anhydrous crystals, having a bitter taste, and melting at  $191$ – $192^\circ$  with some decomposition; it is easily soluble in ethyl, butyl and amyl alcohols, chloroform and glacial acetic acid, difficultly soluble in ether and benzol, and almost insoluble in petroleum-ether and water. The ultimate analysis and molecular



weight determination indicate the formula  $C_{27}H_{40}O_8$ , agreeing with that obtained for *tanghinin* from *Tanghinia venifera*, Poir. Of tests for cerberin may be mentioned: (1) Yellow color upon heating with dilute mineral acids. (2) With concentrated sulphuric acid a transient orange red, after 15–30 minutes a violet color appears first around the edge of the liquid spreading throughout the liquid, finally passing into blue. (3) Concentrated sulphuric acid with phenols (thymol,  $\alpha$ -naphthol, cresols or glycocholic acid), produces a red or violet coloration, while the acid with aldehydes (furfural, saccharose, vanillin, heliotropin, etc.) produces blue colorations. By heating with a dilute alcoholic sulphuric acid, cerberin yields about 63 per cent. cerberetin, a reducing sugar (in very small amount), and very likely a third compound, since considerable loss was noticed and after separating the cerberetin poisonous physiological effects were still obtained. Cerberetin, a citron yellow amorphous powder, is soluble in alcohol, ether, benzol and chloroform, giving intensely yellow colored solutions, insoluble in water and petroleum-ether, it melts at  $85.5^\circ$ ; with concentrated sulphuric acid at first a red color is produced changing to brown or violet, the acid with traces of aldehydes gives the same color as with cerberin; it has the formula  $C_{19}H_{26}O_4$ ; and was found to be poisonous. A comparison of *cerberin*, *tanghinin* and *thevetin* (from *Cerbera Thevetia*, L.), indicate that they are not identical.

	Cerberin.	Tanghinin.	Thevetin.
Melting point, . . . .	$192^\circ$	$182^\circ$	$170^\circ$
Solubility in water, . .	1 : 5555	1 : 20000	1 : 222
Formula, . . . . .	$C_{27}H_{40}O_8$	$C_{27}H_{40}O_8$	$C_{54}H_{84}O_{24} \cdot H_2O$
Decomposition products	$\left\{ \begin{array}{l} \text{yellow cerberetin} \\ C_{19}H_{26}O_4 \text{ and} \\ \text{little sugar} \end{array} \right.$	$\left\{ \begin{array}{l} \text{yellow resin} \\ \text{but no} \\ \text{sugar} \end{array} \right.$	$\left\{ \begin{array}{l} \text{white thevetresin} \\ C_{48}H_{70}O_{17} \\ \text{and sugar} \end{array} \right.$

—Prof. P. C. Plugge, Arch. der Pharm., 1893, 10–34.

*Sumatra Benzoin.*—Professor Tschirch, during a visit to a benzoin tree plantation in Java, made the interesting observation that the trees contained neither secretion nor secretion-cells; in fact, that all parts of the tree were perfectly odorless and that only after wounding the tree did the balsam commence to exude. It follows, therefore, that the tree must contain some constituent, which, under the conditions alluded to, gives rise to benzoin balsam. An examination, having for its object the isolation of this constituent, was made possible, as Professor Tschirch brought with him some bark from

young trees, *Styrax Benzoin*, Dryand. To aid this examination authentic Sumatra benzoin was first investigated. Contrary to the published statements it was found that benzoin was entirely, although somewhat slowly, soluble in ether. By agitating this solution with 4 per cent. solution of soda until neutral reaction resulted, separating the ethereal layer and carefully evaporating it, an oily residue was obtained, in which traces of styrol, benzol and benzaldehyde, 2-3 per cent. styracin and about 1 per cent. phenylpropyl cinnamate were found. From the sodium hydrate solution, vanillin, benzoic and cinnamic acids and the three resins were isolated.  $\gamma$ -resin soluble in sodium carbonate solution; the part insoluble, treated with ether, was again separated,  $\alpha$ -resin dissolving while  $\beta$ -resin remained insoluble. Prolonged boiling of  $\alpha$ - and  $\beta$ -resins with sodium carbonate solution caused them to change into  $\gamma$ -resin; this again by boiling with potassium hydrate solution was decomposed, cinnamic acid and two alcohols resulting; white crystallizable *benzoresinol*,  $C_{16}H_{26}O_4$  (present in small quantity only), and amorphous brown *resinotannol*,  $C_{18}H_{20}O_4$ . The three resins of previous investigators making up the larger part of benzoin, therefore are mixtures of the more or less decomposed esters of cinnamic acid with these two alcohols. Besides *free benzoic acid* there is also present a quantity of *free cinnamic acid*. The bark of the uninjured trees by analysis contained traces of wax, small quantities of phloroglucin and sugar and large quantities of a tannin easily oxidized to a phlobaphen (benzophlobaphen) having the formula  $C_{51}H_{50}O_{21}$ . As the uninjured bark contains neither secretion nor secretion-cells, but does contain large quantities of tannin, and as the balsam contains a large quantity of resinotannol (an alcohol reacting like a tannin) and the balsam formation first takes place in the parts of the bark containing the tannin, it is very probable that benzoin balsam is produced from the tannin of the bark.—Fritz Lüdy, Arch. der Pharm., 1893, 43-95.

*Sumatra benzoin*.—Professor E. Schmidt, supplemental to the previous article, gives some results of an elaborate examination made by C. Denner some years ago, but of which no complete statement ever appeared in print. He isolated *free benzoic and cinnamic acids, styrol, vanillin, benzaldehyde, styracin, benzyl cinnamate*, and *three so-called benzoresins*; the styrol and benzaldehyde were obtained in much larger quantity than by Lüdy so that they could be identified

by a number of chemical and physical tests.—Arch. der Pharm., 1893, 95–98.

*Medicated glycerin suppositories.*—Successful clinical experiments by Dr. Kohlstock in rectal applications of *aloin*, *colocynthin* and *citrullin* (colocynthidin) suggested a combination of these cathartics with the popular glycerin suppositories. These are made containing in each suppository either 0.5 gm. aloin, 0.03 gm. colocynthin or 0.02 gm. citrullin; of these the suppositories containing aloin are used in mild cases of constipation, those containing colocynthin in more serious cases, whilst those containing citrullin are recommended in case of failure of the others. Their action is stated to be reliable; prolonged use may require a small increase in the dose in order to maintain effectiveness.—Pharm. Post, 1893, 104.

*Benzosol* (benzoylguaiacol) has recently been claimed a successful remedy for diabetes; to ascertain the decrease of the sugar in the urine the polariscope was used. The urine of a person undergoing the benzosol treatment was found to be lævogyre and accordingly was pronounced free from sugar, but by the use of Fehling's solution and phenylhydrazine the urine was found to contain about 1 per cent. sugar. Experiments made by administering benzosol to non-diabetic persons proved that this remedy caused lævogyre rotation of the urine; hence, the indications of the polariscope are to be supplemented by other tests for sugar in urine.—Dr. A. Jolles, Pharm. Post, 1893, 101 and 114.

*The solubility of iodoform* in alcohol and ether, as stated in the various pharmacopœias showing considerable discrepancy, Dr. G. Vulpius redetermined these, finding that 67 parts of an alcohol of 90.5 per cent. by volume at 17° to 18° C. dissolved one part iodoform; at the boiling point only 9 parts of this alcohol were required; to dissolve one part iodoform 5.6 parts cold ether were needed.—Pharm. Centralhalle, 1893, 117.

*The volatile acids in butter* are expeditiously determined by a modification of Dr. Kreis' method; to 5 grams of the melted and filtered butter placed in a flask are added 10 cc. of concentrated sulphuric acid. The butter dissolves at once in the acid with liberation of sulphurous acid. After the solution becomes colorless and transparent 150 cc. water are added and then sufficient permanganate of potassium solution until the red color remains for a few

seconds. This causes the oxidation of sulphurous acid and eliminates the source of error in Kreis' method; 110 cc. are next distilled off and titrated as in the well-known Reichert-Meissl's method.—Dr. J. Pinette, *Chemiker Ztg.*, 1893, 395.

*Thiuret and its paraphenol sulphonate.*—The first of these,  $\text{NC}_6\text{H}_5\text{CSH}\cdot\text{NH}\cdot\text{CSH}\cdot\text{NH}$ , a bulky, odorless, crystalline powder, insoluble in water, soluble in alcohol and ether, is offered as an antiseptic to be applied in the form of powder, its action depending upon the liberation of sulphur, cold dilute alkalies easily decomposing it. Of the salts which act more rapidly because of the greater solubility, the one mentioned above is the most suitable as it can be used as 0.3 or 0.4 per cent. aqueous solution. In the pure form it is a yellow, crystalline, odorless powder, having an intense bitter taste.—*Pharm. Ztg.*, 1893, 137.

## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*Estimation of nitrogen in the urine.*—A. Petit and L. Monfet report to the Société de Pharmacie their conclusions in regard to this subject. They consider Kjeldahl's method, with several modifications, the most rapid and most exact of all known methods. The process as modified by them is based on the following principles:

(1) Total transformation of the urinary nitrogen, and of the organic nitrogen in general into ammonium sulphate.

(2) Oxidation and liberation of this ammoniacal nitrogen by a strongly concentrated alkaline hypobromite solution.

10 cc. urine are introduced into an Erlenmeyer flask, and 5 cc. fuming sulphuric acid added drop by drop; heat just to ebullition, and then add a small globule of mercury; when the foaming has subsided, raise the temperature and continue the boiling until the acid liquid has become entirely decolorized, when the oxidation of the nitrogen is complete. Now allow it to cool, add gradually 20 cc. distilled water and cool under a current of water by the careful addition of soda lye, but not to saturation; if this is indicated by a drop of phenolphthaleine solution, several drops of pure sulphuric acid should at once be added. Now pour the contents of the Erlenmeyer flask into a flask of 50 cc. capacity, and complete the volume



with water which has previously been used to wash the first container ; then filter.

Into a graduated tube, closed at one end, containing 20 cc. mercury and 20 cc. of hypobromite solution (prepared by the following formula : bromine, 10 cc.; caustic soda solution, 90 cc., and distilled water, 75 cc.), introduce 10 cc. of the above liquid, which correspond to 2 cc. urine, using a solution of potassium acetate as a separating layer.

When the reaction is finished, place the ureometer into a water vessel, making the levels of the two liquids equal, and note the volume of nitrogen, as well as the temperature and the atmospheric pressure, from which data the weight of nitrogen may be readily calculated ; but troublesome calculations may be avoided by using in the manner indicated a solution of 4.714 gm. of pure dry ammonium sulphate in 200 cc. distilled water ; 1 cgm. nitrogen is yielded for every 2 cc. of this solution.

The authors have applied this process to substances in which the nitrogen occurs in varied forms. For substances, like the pyridine and quinoline bases, in which the nitrogen presents great resistance to oxidation by the Kjeldahl method, they use the smallest possible quantity of water. The following table gives some of their results :

Substance.	Found.	Calculated.	Time Consumed.	
			Hr.	Min.
Dry basic quinine sulphate, . . .	7.56	7.50	1	15
Methylamine hydrochlorate, . . .	20.72	20.70	—	20
Cocaine hydrochlorate, . . . . .	4.145	4.123	2	—
Aniline, . . . . .	15.35	15.37	2	—
Crystallized eserine, . . . . .	15.19	15.27	—	30
Saccharin, . . . . .	7.78	7.65	1	30
Morphine, . . . . .	4.49	4.62	1	—
Aconitine, . . . . .	2.09	2.17	1	15
Dry albumin, . . . . .	15.45	15.53 <sup>1</sup>	—	30
Dry wool, . . . . .	17.06	17.17 <sup>1</sup>	—	45
Analgesin, . . . . .	15.01	16.09	—	—
Pyridine, . . . . .	15.86	17.7	—	—

<sup>1</sup> According to Dumas.

Analgesin yielded after two hours, 11.88 ; after three hours, 13.03 ; and after four hours, 15.01 ; and pyridine after two hours 14.7, and after four hours, 15.86 nitrogen. In both these substances, the oxidation, even after being continued for a long time, still remains

incomplete. However, judging from the increase in the results, they hope it will not be impossible to surmount the difficulties.—*Four. de Pharm. et de Chim.*, March, 1893, p. 297.

*Estimation of hydrochloric acid in the gastric juice.*—S. Mizerski and L. Nencki, in a critical review of the various methods employed for this purpose, consider the colorimetric methods without value in clinical examinations. They have found the chlorometric method of Hayens and Winter (see *American Journal of Pharmacy*, 1892, p. 241) the most satisfactory, since it permits the estimation of chlorine in all its chemical combinations even when only a small quantity of the gastric juice is operated upon.—*Gaz. Lekarska*, through *Rev. intern. de bibliog. méd.*, March, 1893, p. 100.

*Synthetic guaiacol* is prepared by Béhal and Choay by dissolving 58 gm. of sodium in 600 gm. methyl alcohol, and adding 270 gm. of pyrocatechin, also previously dissolved in methyl alcohol. The mixture is heated to 120–130° C. with an excess of methyl iodide; allow it to cool and recover the alcohol by distillation. Treat the residue with sodium oxide and agitate the sodic solution with ether to remove a small quantity of veratrol present. The guaiacol is liberated by means of hydrochloric acid, and then distilled. If the portion passing over at 205° to 207° is cooled by means of methyl chloride, the product obtained in crystals consists of pure guaiacol. It is a white, well-crystallized solid, fusible at 28.5° and boiling at 205° C.—*Rép. de Pharm.*, March, 1893, p. 101.

*Tropacocaine* renders valuable service as a local anæsthetic, according to Dr. Hugenschmidt in *Semaine médicale*. He uses tropacocaine 0.10 gm., and distilled water 2.50 gm., of which preparation ten drops are used for an injection. The advantages of its use as compared with cocaine are, (1) in a dose sufficient for producing anæsthesia it is much less toxic than cocaine, and its action on the vital functions is but little marked; (2) it produces local anæsthesia more rapidly and more profound than cocaine, while it is of an equal duration; (3) the solution of tropacocaine for anæsthetic injections can be preserved for several months by reason of its antiseptic nature, while cocaine shows signs of decomposition and loss of analgesic properties after four or five days.—*Nouv. rem.*, Feb., 1893, p. 56.

*Paico.*—This name designates, in Chile, the two species *Ambrina ambrosioides* and *A. chilensis*. The parts of the plants employed

are the flowering tops, and their properties are probably due to an amber-colored essential oil, having an aromatic odor, characteristic of *paico*. It is used in the form of an elixir, which is prepared by exhausting 400 gm. of *paico* with 600 gm. of alcohol of 20 per cent. in a displacement apparatus; filtering and adding 400 gm. of simple syrup; the dose is a tablespoonful before meals. The medicament is exhibited in cases of chronic catarrh of the digestive apparatus.—*Riv. ital. di Ter. e d'Igiene*, through *Rép. de Pharm.*, March, 1893, p. 120.

*Benzonaphthol* is preferred by M. Huchard, for intestinal antiseptis, to salol or betol, because by its use the often dangerous effects of salicylic acid are avoided; furthermore, it has the advantage of being insoluble and scarcely toxic. The author usually prescribes the following in doses of six to eight cachets per day: *Benzonaphthol*, 20 gm. and pulverized charcoal, 5 gm., for 30 cachets.—*Rép. de Pharm.*, Feb., 1893, p. 86. (See also AMER. JOUR. PHARM., 1892, p. 77 and p. 517).

*Preservation of morphine solutions.*—Dissolve one gm. of morphine hydrochlorate in a mixture of 5 gm. of alcohol and 10 gm. of glycerin, then add 15 gm. of distilled water and filter. According to *La Terapia moderna* this solution will keep without alteration for months.—*Rép. de Pharm.*, Feb., 1893, p. 79.

*Bismuth and boric acid ointment in the treatment of burns.*—Dr. Wertheimer (*Rev. de méd., de chir., et d'obst.*) has formulated the following for the treatment of burns in children: Bismuth subnitrate, 9 gm.; boric acid, 4.50 gm.; lanolin, 70 gm.; and olive oil, 20 gm. The parts should be washed with warm boric acid water, and then several layers of gauze, spread with the ointment, should be applied. For calming the nervous agitation likely to take place, the author prescribes morphine in the dose of 2 to 4 mgm. and chloral according to the following formula: Chloral, 1 gm.; distilled water, 50 gm.; and syrup of bitter orange peel, 15 gm.—*Bull. gén. de Thér.*, 1893, p. 232.

*The use of iodine in the treatment of goitre.*—While iodine has long been used in the treatment of this disease, E. Nazaries gives the following new method of its administration, which he claims to have used with unqualified success: Potassium iodide, 5 to 8 gm.; tincture of iodine, 20 to 30 drops; and distilled water, 150 gm. A

spoonful of this should be diluted with half a litre of water, and this quantity taken daily, during and after meals. The author attributes the favorable results of this treatment to the *continued* action of the medicaments taken internally.—*Bull. de la Soc. de Pharm. de Bordeaux*, Feb., 1893, p. 51.

*Action of acetic and formic acids on oil of turpentine.*—Bouchardat and Oliviero report that by the action of glacial acetic acid on lævogyre oil of turpentine in the cold and at  $100^{\circ}$ , a complex mixture is formed of lævogyre terpen, terpenol acetate ( $C_{10}H_{16}C_2H_4O_2$ ), also the two isomers, borneol acetate and isoborneol acetate. At  $150$ – $200^{\circ}$  the formation of terpenol acetate ceases. The presence of water, in various proportions, retards the combination, until, when 25 molecules of water are present, the action ceases entirely. In the other case a partial transformation of terebentene into active isomeric terpen takes place as is proven by the increase of rotatory power.

The action of *formic acid* differs in being more violent, destroying the rotatory power. In the presence of 1, 3 and 5 molecules of water an abundant formation of free terpin takes place. By this action of formic acid the presence of small quantities of terpin is explained in hydrated volatile oils, which have been kept for a certain length of time, formic acid being invariably present in the volatile oils.—*L'Union Pharm.*, March, 1893, p. 116.

*Liquid oxyphenol (peroxydibenzol)* is obtained by replacing, in a molecule of benzol,  $2C_6H_6$ , 9 atoms of H by an equivalent of the hydroxyl group; its composition is  $C_{12}H_{12}O_6$ . Giuseppe Reale ascribes to it remarkable physiological action, and has used it successfully in diabetes and albuminuria. Albumin boiled in water in the presence of a little oxyphenol loses the property of being coagulated by heat.—*Riv. Ital. di Terap. e Ig.*, through *Rev. intern. de bibliog. méd.*, March, 1893, p. 94.

*Formulas for eye-washes.*—Emile Berger reports to the *Société de biologie*, that by associating several alkaloids, he has obtained a collyrium which is more active and less toxic than when a single alkaloid is used. Thus a mixture of atropine sulphate and duboisine sulphate, of each 0.3 gm.; cocaine hydrochlorate, 2 gm.; and distilled water, 100 gm., yields a mydriatic at least as powerful as atropine in solution 1 to 100, without being equally toxic. The



author gives further, the following two formulas as efficient and well-tolerated preparations for producing myosis, and anæsthesia, respectively :

(I) Eserine sulphate, 1 gm.; pilocarpine hydrochlorate, 2 gm.; and distilled water, 100 gm.

(II) Cocaine hydrochlorate, and pilocarpine hydrochlorate, of each 2 gm.; and distilled water, 100 gm.—*Nouv. rem.*, Feb., 1893, p. 55.

*Tonic wine.*—Wine of kola, of cinchona, of gentian, of calumba, of each 20 gm.; Fowler's solution, 10 gm.; tincture of nux vomica, 5 gm. A small glassful should be taken twice a day at meal time.

*Tonic pills.*—Extracts of cinchona and of kola, of each 5 gm.; extract of rhubarb, 2.50 gm.; extract of nux vomica, 0.50 gm.; iron arseniate, 0.30 gm.; and kola powder, sufficient for making 100 pills, of which 4 should be taken per day.—*Monit. de la Phar.*, March, 1893, p. 1242.

*Brillantín* is a preparation for the hair, for which the *Bullet. de Phar. de Lyon* gives the following three formulas :

(1) Castor oil 6, castile soap 2, benzoin 2, alcohol 200 gm., attar of roses or of neroli sufficient.

(2) Glycerin 10, alcohol 100, rose water 100 gm.

(3) Castor oil 6, glycerin 6, benzoin 2, alcohol 200 gm. Perfume.

## ADULTERATED CASTOR AND OLIVE OILS.

BY E. J. PARRY, B.SC., AND P. A. ESTCOURT, A.I.C.

During the last six months we have had a large number of samples of castor oil and olive oil sent to us for analysis, and have been surprised to find what a small proportion of them were genuine. Out of fourteen samples of castor oil six were genuine and eight adulterated, and from fourteen samples of olive oil three were pure and eleven adulterated. Any sample of castor oil whose specific gravity does not fall within the limits of .956 and .966 should be viewed with grave suspicion, and if it be below .950 or above .969 is almost certainly adulterated. The saponification equivalent of pure castor oil—that is, the number of grammes saponified by a litre of normal alkali—should fall between 310 and 320, and the iodine absorption, according to Hübl, falls between 84 and 84.7 : our own experiments give 85. As will be seen from Table I, none of the figures contained agreed with these. With regard to the rise in temperature when

mixed with an equal weight of sulphuric acid—that is, 2 volumes of oil to 1 of sulphuric acid (97 per cent.)—our figures do not agree with those recorded by other observers. Allen gives 65° C., Archbutt gives 46° C., and we have repeatedly found 72° to 74° for castor oil of undoubted purity.

TABLE I.

	Specific Gravity.	Saponification Equivalent.	Iodine Absorption.	Temperature Rise.
1, . . . . .	.9735	400	67	60° C.
2, . . . . .	.9721	420	65	62° C.
3, . . . . .	.9723	400	64	63° C.
4, . . . . .	.9740	445	—	60° C.
5, . . . . .	.9766	428	—	62° C.
6, . . . . .	.9752	403	—	61° C.
7, . . . . .	.9739	440	—	60° C.
8, . . . . .	.9719	440	—	62° C.

The usual adulterants of castor oil are poppy seed, cocoanut, lard, rosin and blown oils. The figures above quoted practically exclude all but rosin and blown oils. Moreover, in every case the samples were freely soluble in glacial acetic acid, which is a further indication of the absence of other oils. Since the gravity of blown oil seldom rises above .970, and its saponification equivalent seldom exceeds 284, we were confident that rosin oil was the adulterant used. The high gravity and saponification equivalent were confirmatory of this, as was the low iodine absorption. And if our observations on pure castor oil were correct, as we certainly believe them to be, in the case of the rise in temperature, the observed rise in the case of the impure samples pointed to the presence of hydrocarbons. To absolutely confirm our suspicions we used three further tests of extreme simplicity, but of great utility. A drop of the oil was placed on the back of the tongue, and in a minute nothing but the disagreeable taste of rosin oil could be detected. The samples did not appear fluorescent in bulk, but when mixed with an equal volume of ether and examined in tubes they were distinctly fluorescent. This is the usual method of observing the fluorescence of oils, but in the case of viscous oils, like castor, we have found the fluorescence much more intense when the sample without admixture with ether is allowed to run down the side of a thin glass tube and the

thin layer adhering to the side is examined. Under these conditions the samples were extremely fluorescent. Finally, a few drops of each sample were dissolved in carbon bisulphide and treated with stannous bromide, with slight excess of bromine. In every case a fine coloration, from deep red to rich purple, was obtained, pure castor oil yielding little or no color. Thus every single sample was clearly proved to be adulterated with rosin oil. By adding absolute alcohol in the proportion of 2 parts to 1 of oil a large portion of rosin oil separated out, and by treatment with slaked lime most of the rosin oil combined loosely with the alkali, and the castor oil when filtered off from the lime compound had a specific gravity of .9665. By separating the rosin oil out by the addition of alcohol its specific gravity can be taken, and the percentage of rosin oil approximately calculated. However, we found that saponification of the oil with alcoholic potash, evaporating, to drive off the alcohol, and extracting the unsaponifiable matter with ether, was the most direct method of ascertaining the proportion of rosin oil, which we found to range from 35 to 40 per cent.

Before passing on to the samples of impure olive oil, it will be as well to review the results which are obtained from the genuine oil.

The specific gravity is one of the most important features in enabling one to judge of the quality of the oil to be examined. Of many genuine samples examined by us the specific gravity at  $15.5^{\circ}$  C. ( $60^{\circ}$  F.) compared with water at the same temperature never exceeded .917. In fact, we have never found so high a gravity. Low densities have been observed, but .914 is the lowest we have come across, and the sample having this density contained a considerable amount of free acid. The general adulterants of olive oil are cotton-seed, poppy-seed, arachis, sesame, rape and hydrocarbon oils. The addition of any of these oils except rape and the lighter hydrocarbons would tend to increase the density. The saponification equivalent is not of much value in assisting us to detect the adulteration in the oils, the saponification numbers of the oils generally used for sophisticating olive oil being nearly the same as those of the pure oil. If the adulterant were a hydrocarbon oil, or one from a cruciferous plant, the test would be of great value, as in these cases the saponification equivalent would be sensibly higher than those found for pure olive oil.

The observation of the rise of temperature with sulphuric acid is a most important factor, and may be considered to be, if not the most important, one of the most valuable tests of those used to ascertain the genuineness or otherwise of the olive oil submitted for analysis. Pure olive oil, according to many observers, gives  $39^{\circ}$  to  $44^{\circ}$ ; our own experiments with the pure oil gave  $40^{\circ}$  to  $43^{\circ}$ . The usual adulterants of olive oil give much higher figures than these. We found the elaidin test of little value, except, of course, in indicating that the samples were sophisticated; for identification of the adulterant our results were not such as would allow us to pass an opinion as to the oil used for mixing with the olive oil.

The behavior of the samples of oil with glacial acetic acid (E. Valenta, *Dingl. polyt. J.*, cclii, 296; *Four. Chem. Soc.*, xlvi, 1078) was observed. Equal parts of the oil and glacial acetic acid were mixed and gently heated, with shaking, until the oil dissolved in the acetic acid. Our observations gave for the pure samples we examined  $95^{\circ}$  C., whilst our figures for the oils suspected of not being genuine were very much lower in every case. The importance of this test can only be appreciated after long and careful trial.

We also used Hübl's iodine absorption method. For pure olive oil Hübl gives 81.6 to 84. Our own experiments gave 81.0 to 84.5 for the pure oil. The figures obtained from the oils commonly used as adulterants are much higher than this, as were the figures we obtained from our samples.

TABLE II.

	Specific Gravity.	Rise of Temperature.	Iodine Absorption.	Saponification Equivalent.	Valenta.
I, . . . .	.9199	$60^{\circ}$ C.	100.0	288	$68^{\circ}$ C.
2, . . . .	.9182	$60^{\circ}$ C.	97.5	288	$60^{\circ}$ C.
3, . . . .	.9186	$60^{\circ}$ C.	93.0	286	$55^{\circ}$ C.
4, . . . .	.9194	$55^{\circ}$ C.	98.5	293	$55^{\circ}$ C.
5, . . . .	.9190	$57^{\circ}$ C.	99.0	297	$50^{\circ}$ C.
6, . . . .	.9187	$65^{\circ}$ C.	96.5	288	$58^{\circ}$ C.
7, . . . .	.9187	$64^{\circ}$ C.	97.0	288	$55^{\circ}$ C.
8, . . . .	.9188	$66^{\circ}$ C.	96.0	290	$55^{\circ}$ C.
9, . . . .	.9187	$64^{\circ}$ C.	97.5	290	$50^{\circ}$ C.
10, . . . .	.9188	$68^{\circ}$ C.	96.5	288	$54^{\circ}$ C.
11, . . . .	.9187	$67^{\circ}$ C.	97.5	289	$52^{\circ}$ C.
Pure oil, . .	.9170	$40-43^{\circ}$ C.	81-84.5	285-296	$95^{\circ}$ C.



We applied still another valuable test—that of the melting-point of the fatty acids, obtained after saponifying a quantity of the oil with alcoholic potash, breaking up the soap with sulphuric acid, and washing free from the latter with distilled water. The fatty acids of pure olive oil obtained in this manner we found almost liquid at  $23^{\circ}$  C., whilst many of the oils before mentioned melted at as high as  $35^{\circ}$  C.

Our melting-point figures for the oils submitted for analysis were very much higher than those of pure olive, whilst they were slightly lower than those of cotton-seed oil. Our general figures are embodied in Table II.

On examining these figures, we found that the specific gravity, combined with the saponification equivalent, showed the absence of a hydrocarbon oil. The difficulty was now to identify, if possible, the foreign vegetable or fat oil present. Except the saponification figures, no others agreed with those found by us of oils of known purity. Arachis oil of the poorer quality could have been used, the specific gravity of the poorer class being .920; but we examined for this oil by Renard's test, and were able to say that it was not present. In the same manner sesame oil, on account of its gravity and other general figures, might have been the adulterant, but, carefully using the color-tests, we were able to dismiss it from our minds. We next turned our attention to cotton-seed oil, this oil being one used very largely for the purpose of adulterating olive oil, on account of its pleasant taste and general adaptability for eating and culinary purposes. We found that the high melting-points of the fatty acids of the samples submitted to us agreed well with that of cotton-seed oil, whilst the general color-tests and elaidin tests also confirmed our suspicions.

To further strengthen our opinion that cotton-seed was the adulterant, we carefully prepared the fatty acids of the suspected oils and dissolved them in alcohol, and then, after the addition of nitrate of silver, heated some to the temperature of boiling water. After some little time the silver was much reduced, and much blackening was observed. It may also be remarked that, on heating the fatty acid obtained after saponification for some time at the temperature of boiling water, the characteristic odor of cotton-seed oil was noticed, so that, by a review of these results, we were enabled to return every one of these samples as adulterated with cotton-seed oil.—*The Chemist and Druggist*, April 8, 1893, p. 488.

RESEARCHES ON OPIUM ALKALOIDS.<sup>1</sup>

BY T. AND H. SMITH AND CO.

*Xanthaline*.—This new alkaloid was discovered in our laboratory as far back as 1881, but, owing to various reasons, publication has been deferred until now. It occurs in the acid mother liquids resulting from the crude hydrochlorates of morphine and codeine in the Robertson Gregory process, and is precipitated therefrom, along with narcotine, papaverine, and many impurities, on diluting and carefully neutralizing those liquids.

That precipitate is purified by washing with dilute caustic soda and hot water, and subsequent treatment with weak spirit. The remaining crystals are dissolved in boiling water, with addition of as much hydrochloric acid as is requisite to dissolve three-fourths of them, the remaining fourth being then added, and the whole allowed to boil for some time. After filtration, the insoluble residue is well washed with hot water and again treated with boiling spirit. A considerable portion still remains undissolved, and this is now dissolved in dilute hydrochloric acid and filtered hot. If the liquid be at all concentrated, the filtrate will solidify into a spongy mass of crystals, which, after being freed from the dark liquor, present a similar appearance to narceine, but of bright yellow color. Recrystallization from dilute hydrochloric acid and washing with strong spirit renders the salt of the new alkaloid pure.

The alkaloid itself is readily precipitated from the hydrochlorate by boiling with water, and is left behind as a white powder on heating the hydrochlorate above 100° C. for several hours. From a hot alcoholic solution of the salt, it is thrown down by an alkali as a white crystalline powder, insoluble in water and in alkalies, sparingly soluble in boiling spirit, more easily in benzene, and very easily in chloroform. Its melting point is 206° C. It is a weak base, but forms well-defined salts with mineral acids if these are used in excess, all these salts possessing a more or less intense yellow color. The nitrate is of a bright orange color. In accordance with this very characteristic property of forming yellow salts the name xanthaline (*ξανθός* = yellow ; *ἅλς* = salt) was chosen for this new alkaloid.

<sup>1</sup> From papers read before the Pharmaceutical Society of Great Britain at the evening meeting in Edinburgh, March 15. *Phar. Jour. and Trans.*, March 25, 1893, p. 793-795.

The following analyses<sup>1</sup> were made, pointing to the formula



- (1) .322 grm. gave .8025 grm.  $\text{CO}_2$  and .1655 grm.  $\text{H}_2\text{O}$ .
- (2) .218 grm. gave .5395 grm.  $\text{CO}_2$  and .1120 grm.  $\text{H}_2\text{O}$ .
- (3) .214 grm. gave .5328 grm.  $\text{CO}_2$  and .110 grm.  $\text{H}_2\text{O}$ .
- (4) .3705 grm. gave .9215 grm.  $\text{CO}_2$  and .1815 grm.  $\text{H}_2\text{O}$ .
- (5) .467 grm. gave 16.7 cc. N; B = 758.5 mm.; t = 8°; or .0201235 grm. N.
- (6) .6135 grm. gave 22.8 cc. N; B = 745 mm.; t = 12.5°; or .026408 grm. N.

The substance used for Nos. 1, 2 and 5 was identical; for 3 and 6 recrystallized, all dried over vitriol. The substance used for No. 4 was previously heated to 150° C.

#### XANTHALINE.

	Calculated for		Found.					
	$\text{C}_{37}\text{H}_{36}\text{N}_2\text{O}_9$	$\text{C}_{36}\text{H}_{36}\text{N}_2\text{O}_9$	1	2	3	4	5	6
C, . . . . .	68.10	67.50	67.97	67.50	67.90	67.83	—	—
H, . . . . .	5.52	5.62	5.71	5.71	5.71	5.44	—	—
N, . . . . .	4.29	4.38	—	—	—	—	4.31	4.31
O, . . . . .	22.09	22.50						
	100.00	100.00						

*Hydrochlorate of Xanthaline.*—As mentioned above, xanthaline dissolves freely in dilute warm hydrochloric acid, and separates from the bright yellow solution on cooling, in voluminous yellow needles which, after withdrawing the liquid, should be washed with a little cold strong spirit and dried at a very gentle heat. This salt is perfectly stable, but loses weight over vitriol. If heated for some hours to about 150° C., the pure base, free from chlorine, is left. In order to prove the correctness of the formula deduced from the analyses of the base, the hydrochlorate was likewise analyzed.

(1) .254 grm. burned with chromate of lead and metallic copper gave .519 grm.  $\text{CO}_2$  and .1355 grm.  $\text{H}_2\text{O}$ .

(2) .548 grm. gave .2015 grm.  $\text{AgCl}$  or .0498 Cl.

<sup>1</sup> The elementary analyses cited in this paper were kindly carried out by Professor Hermann Ost, of Hanover, then at Leipzig.

(3) .468 grm. lost on being heated to  $160^{\circ}$  C., until the weight remained constant, .086 grm. ( $\text{HCl} + \text{H}_2\text{O}$ ).

	Calculated for	
	$\text{C}_{37}\text{H}_{36}\text{N}_2\text{O}_9 \cdot 2\text{HCl} + 4\text{H}_2\text{O}$	$\text{C}_{36}\text{H}_{36}\text{N}_2\text{O}_9 \cdot 2\text{HCl} + 4\text{H}_2\text{O}$
C, . . . . .	55.71	55.03
H, . . . . .	5.77	5.86
Cl, . . . . .	8.91	9.04
$\text{H}_2\text{O} + \text{HCl}$ , . . . . .	18.20	18.47

	Found		
	1	2	3
C, . . . . .	55.73	—	—
H, . . . . .	5.93	—	—
Cl, . . . . .	—	9.1	—
$\text{H}_2\text{O} + \text{HCl}$ , . . . . .	—	—	18.37

*Reactions.*—Xanthaline dissolves in strong sulphuric acid, with a deep orange color like thebaine. It is not decomposed, however, unless heat be applied, and on standing, or more quickly on addition of water, the dark orange gives way to a pale yellow, and the sulphate of xanthaline crystallizes out in soft yellow needles. This reaction is very striking.

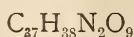
Nitric acid also dissolves xanthaline in the cold without decomposition, and solutions containing a large excess of dilute nitric acid can even be heated to the boiling point without decomposition. The nitrate crystallizes out on cooling in beautiful, shining, orange yellow needles.

*Hydroxanthaline.*—While xanthaline shows great resistance to oxidizing agents, it is readily attacked by nascent hydrogen. If to the hot solution of the sulphate containing an excess of acid, granulated zinc be added, a violent reaction sets in, following which the yellow color of the liquid is found to have disappeared. On cooling, the liquid almost solidifies into a mass of white crystals, which are a double compound containing zinc and the sulphate of another new base, *hydroxanthaline*.

To separate the latter, the solution is evaporated to dryness and treated with strong boiling alcohol, which takes up very little zinc, but dissolves the sulphate of hydroxanthaline readily. The clear alcoholic solution is evaporated, the resulting crystalline magma pressed and recrystallized. It is very soluble in water, and the base is precipitated from its solution as a resinous-looking body, which quickly solidifies. Recrystallized from weak spirit, it forms hard, white crystals. These melt at  $137^{\circ}$  C., and are anhydrous.



The following analyses point to the formula :



for the new base.

- (1) .3528 grm. gave .8734  $\text{CO}_2$  and .1868  $\text{H}_2\text{O}$ .
- (2) .3180 grm. gave .7828  $\text{CO}_2$  and .1712  $\text{H}_2\text{O}$ .
- (3) .2402 grm. gave .5933  $\text{CO}_2$  and .1280  $\text{H}_2\text{O}$ .
- (4) .289 grm. gave 11.2 cc. N; B = 753 mm.; t = 15° C. or .013 grm. N.

#### HYDROXANTHALINE.

	Calculated for		Found			
	$\text{C}_{37}\text{H}_{38}\text{N}_2\text{O}_9$	$\text{C}_{36}\text{H}_{38}\text{N}_2\text{O}_9$	1	2	3	4
C, . . . . .	67.89	67.29	67.52	67.14	67.36	—
H, . . . . .	5.81	5.92	5.90	5.98	5.92	—
N, . . . . .	4.28	4.36	—	—	—	4.50

A simultaneous combustion of salicylic acid under the same conditions, furnished the following values:

	Calculated for $\text{C}_7\text{H}_6\text{O}_3$ .	Found.
C, . . . . .	60.87	60.72
H, . . . . .	4.35	4.38

There can be no doubt as to the correctness of the formula with the higher carbon for hydroxanthaline. It is nearly insoluble in water, but dissolves very freely in alcohol, benzene and similar solvents. It forms colorless salts which are very soluble but crystallize well. The least trace of this alkaloid at once forms, with strong sulphuric acid, a deep violet solution, which becomes colorless on dilution with water, but is reproduced by adding more acid.

This color test is extremely delicate, and resembles that for cryptopine, with this difference, that with the latter alkaloid a trace of nitric acid is necessary to develop the color, while with hydroxanthaline pure sulphuric acid produces it at once.

*Gnoscopine*.—This alkaloid, which was discovered in 1878,<sup>1</sup> and to which the formula  $\text{C}_{34}\text{H}_{36}\text{N}_2\text{O}_{11}$  was then ascribed, has since been obtained in larger quantity, which allowed of its being more closely studied. The hydrochlorate was prepared in an absolutely pure state, and the alkaloid obtained from this pure salt, by precipitation and recrystallization from boiling alcohol, was subjected to analysis.

<sup>1</sup> Pharm. Journ. and Trans., [3], 9, p. 82.

The following results were obtained :

- (1) .5165 grm. gave 1.207 grm.  $\text{CO}_2$  and .260 grm.  $\text{H}_2\text{O}$ .
- (2) .2070 grm. gave .4835 grm.  $\text{CO}_2$  and .106 grm.  $\text{H}_2\text{O}$ .
- (3) .288 grm. gave .673 grm.  $\text{CO}_2$  and .1448 grm.  $\text{H}_2\text{O}$ .
- (4) .602 grm. gave 17.8 cc. N ; B = 758 mm ; t =  $8^\circ$  C.
- (5) .573 grm. gave 17.4 cc. N ; B = 752 mm ; t =  $9^\circ$  C.

	Calculated for		Found.				
	$\text{C}_{22}\text{H}_{23}\text{NO}_7$	$\text{C}_{34}\text{H}_{36}\text{N}_2\text{O}_{11}$	1	2	3	4	5
C, . . . . .	63.93	62.96	63.73	63.70	63.73	—	—
H, . . . . .	5.57	5.56	5.59	5.69	5.57	—	—
N, . . . . .	3.39	4.32	—	—	—	3.56	3.61

The analyses show that gnoscopine is isomeric with narcotine. To make this absolutely certain, a combustion of pure narcotine was made with the following result :

.4125 grm. narcotine gave .9645 grm.  $\text{CO}_2$  and .2085 grm.  $\text{H}_2\text{O}$  ; or, C = 63.77 per cent. ; H = 5.62 per cent.

That gnoscopine is a distinctly different alkaloid from narcotine is shown by its melting point, which lies at  $228^\circ$  C., while narcotine melts at  $178^\circ$  C. Further, by its slight solubility in boiling alcohol (the solubility being only about one-tenth of that of narcotine), by the characteristic slender needles in which it is almost entirely deposited from the hot alcoholic solution on cooling, and by its hydrochlorate, which crystallizes with ease from slightly acidified watery solutions in colorless flat prisms of a glassy lustre, whereas the hydrochlorate of narcotine forms hard crusts of white needle-shaped crystals.

The hydrochlorate of gnoscopine readily loses water of crystallization if exposed to the air ; when heated to  $120^\circ$  the crystals swell up, leaving the alkaloid as a white spongy mass.

1.26 grm. of air-dry hydrochlorate, but slightly opaque, heated for two hours to  $120^\circ$  C., lost .225 grm. or 17.86 per cent.

$\text{C}_{22}\text{H}_{23}\text{NO}_7, \text{HCl} + 3\text{H}_2\text{O}$  contain 17.97 per cent. ( $\text{H}_2\text{O} + \text{HCl}$ ).

On the other hand, gnoscopine and narcotine show identical reactions when treated with sulphuric and nitric acids, and yield the same products of oxidation when gently heated with a mixture of sulphuric acid and manganese peroxide.

The experiment of converting narcotine into isomeric gnoscopine has proved quite successful. When narcotine is heated with glacial acetic acid in a sealed tube to  $130^\circ$  C. for two or three hours, the liquid contents of the tube being then diluted and precipitated by

an alkali, and the resulting precipitate washed with warm water, it is found that after dissolving out with hot spirit the bulk of the unchanged narcotine, a portion, which is much less soluble, remains. This residue, after complete purification, has been proved to be in every respect identical with gnoscopine as prepared from original opium liquids.

## OBSERVATIONS ON DECOMPOSING CHLOROFORM.<sup>1</sup>

By DAVID BROWN, F.C.S.

At the last meeting of the British Pharmaceutical Conference, I withdrew the zinc iodide and starch test in favor of Professor Ramsay's baryta water one, for the first indications of decomposition in chloroform. The state of decomposition which the chloroform was in at the time the experiments were made justified me in doing so. I now find, however, after carefully watching the decomposition in sunlight from the first indications of it until it has reached a point where no reaction is obtained with zinc iodide and starch, that this reagent deserves the first place as an indicator, the nose the second, and that baryta water may be dispensed with altogether. The chlorine reaction had almost disappeared from the chloroform employed in my previous experiments, which explains how I was led to place baryta water as a test for decomposition in such a false position. It was invariably observed that no reliable reaction with baryta water was obtained until decomposition was unmistakably recognized, both by zinc iodide and starch and by the sense of smell, and, further, that the carbonyl chloride reaction was obtained from samples in the most advanced stages of decomposition.

Soon after zinc iodide and starch begins to indicate, decomposition may easily be recognized by the peculiar odor of carbonyl chloride, which indication renders the application of baryta water, or any other reagent, quite unnecessary for the purpose of establishing the presence of decomposition.

During its first stages a distinct reaction is obtained with zinc iodide and starch, but none with baryta water, a separation of water being also observed. After further decomposition zinc iodide and starch gives a more marked reaction than at first, and baryta water

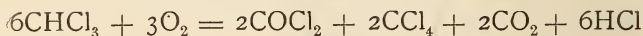
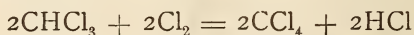
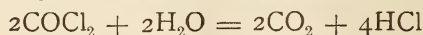
<sup>1</sup> Read before the Pharmaceutical Society of Great Britain at an evening meeting in Edinburgh, March 15; *Phar. Jour. and Trans.*, March 25, 1893, p. 792.

also reacts, but faintly. Still following the decomposition, it is found that both reagents continue to give marked reactions until a point is reached, when that produced by zinc iodide and starch is observed to become less marked, and finally to disappear altogether, while the reaction with baryta water may still be obtained. A small quantity of deep straw-colored liquid is also observed at this stage floating on the surface of the chloroform.

At this point there remains a considerable quantity of undecomposed chloroform, which may, either before or after separating the decomposition products, be again put into an active state of decomposition by simply removing the stopper from the bottle for a few seconds, replacing it, and again exposing it to sunlight, when reactions similar to those already described with zinc iodide and starch are obtained. This result has been reproduced several times with about a dozen different samples of chloroform.

Results such as I have described could not have been obtained if Professor Ramsay is correct in saying that carbonyl chloride and hydrochloric acid are the only products obtained from chloroform decomposing in the presence of air.

The following equations supply a probable explanation of the changes observed, although they do not explain all the results obtained. No evidence of the presence of carbon tetrachloride having been found in the products is certainly a weak point, but it is well known that chlorine and chloroform, when brought into contact, produce it, and it will be seen from the equations that the conditions necessary for its production exist in the early stages of decomposition.



In support of this view, chlorine, water and carbonyl chloride are found in the early stages, the chlorine being first recognized, and disappearing with the water at a more advanced stage, and in the carbonyl chloride reaction being invariably obtained, not only in the early but also in the most advanced stage met with.

The time required, the small quantities of products obtained after waiting for months, and the difficulties to be faced in a work's



laboratory when dealing with them led me to give up the idea of attempting to follow up the subject quantitatively, but I am able to say, from the results of work done in this direction, that the quantity of carbonyl chloride found in different samples of decomposing chloroform, although appearing to be very large, judging by the powerful smell and the large volume of vapor evolved, is in fact very small, 0.57 per cent. being the highest amount found, and further that the ratio which exists between it and chlorine precipitable by silver nitrate in the early stages, changes as decomposition advances, the former decreasing and the latter increasing.

In the early stages we find 1  $\text{COCl}_2$  to 1.29  $\text{HCl}$ .

In the later stages we find 1  $\text{COCl}_2$  to 4.69  $\text{HCl}$ .

The ratio as represented by the equations in similar stages is 1 to 1 + 1 to 3, the difference being no doubt due to loss of carbonyl chloride.

The straw-colored liquid found in the advanced stages contains no free chlorine; it consists of a strong aqueous solution of hydrochloric acid in which very faint traces of carbonyl chloride are found and contains 35.45 per cent. of  $\text{HCl}$ .

The presence of this liquid in the advanced stages presents difficulties which cannot at present be satisfactorily explained; it seems highly probable, however, that the hydrochloric acid produced is dissolved in some of the water, which would otherwise have been used in decomposing carbonyl chloride.

The results of an incomplete investigation which have been laid before you do not, in every respect, establish the correctness of the equations given, but they may safely be accepted as representing changes which have been observed during the decomposition of chloroform in the presence of a limited supply of air, and justify the rejection of Prof. Ramsay's baryta water test and the substitution of the zinc iodide and starch one for it.

The chloroform employed was pure, of sp. gr. 1.500, and had been dehydrated with barium oxide.

In the course of these experiments some points were brought out which, although they do not throw further light on the actual changes which take place during decomposition, may be new to some and of interest to others.

Chloroform, such as I have described, has been exposed to sunlight in a Torricellian vacuum for 5 months, equal to 153 hours

sunshine, without change; the same result was observed after 4 months, equal to 106 hours sunshine, when it was exposed in half-filled white glass flasks, hermetically sealed after the air had been expelled by boiling the contents briskly for several minutes. When exposed in white glass stoppered bottles, decomposition had begun in five days, equal to 12½ hours sunshine. These results point to the absence of any oxygenated impurity in the chloroform capable of supplying oxygen for its decomposition, and to the greater stability of chloroform when kept in vacuo.

When a stream of dry oxygen is passed through the chloroform before exposure, decomposition takes place after four hours sunshine. This is interesting in connection with Mr. T. G. H. Nicholson's proposal to introduce an "oxy-chloroform" for the purpose of increasing blood pressure and regulating respiration during its administration, and it suggests the propriety of keeping the two substances apart until they are actually required.

When the sp. gr. is reduced to 1.498 no decomposition had taken place after exposure in white glass stoppered bottles for 144 days, equal to 141 hours sunshine, which confirms the character for stability which chloroform of a reduced sp. gr. has maintained for upwards of thirty years.

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## ESTIMATION OF THE NITROGENOUS CONSTITUENTS OF COMMERCIAL PEPTONE.<sup>1</sup>

BY A. STUTZER.

The value of commercial peptones depends essentially on the amount of albumose and peptone they contain. Gelatin and gelatin-peptone, leucin, tyrosin, and other decomposition products are comparatively valueless. The following process is directed to the estimation of these constituents: In all cases, the amount of any precipitate is not found by weighing, but is calculated from the result of a nitrogen estimation by Kjeldahl's process, on the assumption that they all contain 16 per cent. Of dry preparations 5 grams is taken; of fluids, 20–25 grams. This is warmed with 200 cc. of water, feebly acidified with acetic acid, boiled and filtered, the filtrate being made up to 500 cc. The filter, with the moist precipitate, is

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<sup>1</sup> *Zeit. anal. Chem.*, **31**, 501–515; *Jour. Chem. Soc., Abstr.*, 1893, ii, 146.

at once submitted to Kjeldahl's process, and a correction is made for the nitrogen in the paper. This gives the amount of unchanged albuminous substances. In a well made preparation these should not be present. The nitrogen in the filtrate is also determined, and the sum of the two stated as total nitrogen. A fresh portion of substance dissolved in 25 cc. of water (or, if a liquid, 50 cc. concentrated to 25 cc.), is gradually mixed with 250 cc. of absolute alcohol, and filtered after 12 hours. The filtrate, which contains the gelatin-peptone, the leucin, tyrosin, and other decomposition products, is freed from alcohol and dissolved in water. Any insoluble matter is filtered off, and regarded as albumose. The clear solution is made up to 500 cc., and 100 cc. of this, warmed to about 40°, is precipitated with 10–15 cc. of a paste of mercuric oxide, containing about 15 per cent., and prepared by pouring mercuric chloride into dilute soda, washing thoroughly, and preserving in the dark. After stirring for a few minutes, the mixture is filtered and the nitrogen determined in the precipitate and filtrate. The former contains the gelatin-peptone, with unknown decomposition products of albumose and peptone. The filtrate contains the leucin, tyrosin, and other products of a digestive fermentation which has been carried to excess, together with part of the so-called flesh bases (creatin, etc.), which are very sparingly soluble in 95 per cent. alcohol. Instead of mercuric oxide, phosphotungstic acid may be used. This reagent, used in excess, precipitates none of the flesh bases except xanthin and hypoxanthin, of which, from their sparing solubility, only traces can be present in the alcoholic solution.

The alcohol precipitate containing the albumose, gelatin and peptone is rinsed with water into a beaker and warmed until the alcohol is expelled. Any albumose which has been rendered insoluble is filtered off and washed with hot water. The clear solution is made up to 500 cc., and of this, 50 cc., mixed cold with an equal volume of dilute sulphuric acid (1 vol. to 3 vols. of water), is completely precipitated with phosphotungstic acid. The nitrogen in the precipitate gives the joint amount of the albumose, peptone and gelatin. 100 cc. of the same solution, concentrated on the water-bath to 8–10 cc., is mixed with 100 cc. of a cold saturated solution of ammonium sulphate. The precipitate is collected and washed with a saturated solution of ammonium sulphate. It is then dissolved in tepid water, and whilst one portion of the solution is

used for nitrogen estimation, another is precipitated by barium chloride, to ascertain the amount of adhering ammonium sulphate. (The relation of the ammonia to the sulphuric acid in the solution used should be determined, not calculated.) The corrected nitrogen in the precipitate gives the amount of albumose and gelatin. The peptone is known by difference, its actual presence being confirmed by concentrating the remainder of the solution, precipitating the albumose and gelatin by solid ammonium sulphate, and testing the filtrate by adding a trace of cupric sulphate and a large excess of strong soda solution. Peptone gives a characteristic red color.

The gelatin is best estimated by means of the viscosimeter, the viscosity being compared with that of a standard solution of the best white gelatin, to which an equal volume of a 20 per cent. solution of serum peptone, free from gelatin, has been added. A 10 per cent. solution of the substance is prepared and cooled for three hours to a temperature lower than that at which the comparison is to be made. It is then gradually warmed to a standard temperature, and immediately examined for viscosity. Very dilute solutions may be compared at 0-1°, whilst strong ones may need to be warmed to 25°, but it is not permissible to warm above the standard temperature, and again cool just before testing. Calling the viscosity of a 10 per cent. solution of serum peptone 100, the addition of 0.25 per cent. of gelatin raises it to 130 at 0-1°, 114 at 15°, 106 at 20°.

Having now ascertained the amount of nitrogen in the alcohol precipitate in the form of albumose, peptone and gelatin, the remaining nitrogen is to be regarded as belonging to the flesh bases. The principal of these is creatin, with 32.8 per cent. of nitrogen, whence the multiplication of the nitrogen by the factor 3.12, gives the total amount of the bases with but small error.

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## MINUTES OF THE PHARMACEUTICAL MEETING.

APRIL 25, 1893.

On motion of Prof. Remington, Mr. McIntyre was called to preside. The minutes of the last meeting were read, and no corrections being required, they were approved.

Professor Trimble presented two quarto volumes of Macquer's Dictionary of Chemistry, 1778. It is interesting as a history of the science at that time.



Dr. J. A. McFerran read a paper upon the subject of *compressed tablets*, and gave illustrations with two machines, explaining the methods necessary to obtain success, and showing that nearly every separate substance must be treated in a manner suited to itself to succeed thoroughly.

At the conclusion of the illustrations Professor Remington moved that a hearty vote of thanks be tendered to Dr. McFerran for his paper, and the painstaking manner in which he had illustrated the subject with the machines. This was given unanimously.

Dr. Lowe moved that a committee of three be appointed to take up the subject of compressed tablets and get prescription druggists to give the results of their experience; this was amended by referring it to the Committee on Pharmaceutical Meetings.

Mr. Summers, recently returned from the West Indies, was present and exhibited a number of specimens of interesting drugs, and products of Trinidad and the adjoining islands. The bark of the *lace tree* can be separated into fine layers which resemble very greatly a lace ruffle, its only use is for decorative purposes. *Guava* fruit yields the much esteemed tropical preserve known as guava jelly. *Sapodilla* is a delicious fruit; so is the *Mango* which Mr. Summers thought to be almost a curse in the West Indies, as the laboring classes there, negroes mostly, would not work if they could live without doing so, and as this tree ripens its fruit nearly every month in the year, it can readily be seen that work is not in great favor. The leaves of two plants which flourish in the West Indies, called, respectively, fibre plant, *Agave rigida*, and may pole, *Sansevieria longifolia*, yield valuable fibres; those of the former measuring over 45 inches and those of the latter 48 inches in length; the fibres of the former are much finer and have a soft flaxen feel when handled.

*Cacao* fruit was exhibited in three varieties, the finest being obtained in Trinidad, growing at elevations varying from 300 to 1,500 feet. These fruits called out quite a discussion, and a number of photographs were exhibited; Mr. Summers proposed to give a fully illustrated talk upon the results and observations made on his recent trip at the opening of the meetings next fall.

A vote of thanks for the very interesting talk was voted to Mr. Summers unanimously.

A formula for *liquor ferri salicylatis* was given in response to a request. The formula given in Remington's practice of pharmacy is modified by adding a portion of glycerin:

R

Ferrous sulphate, pure, . . . . .	384 grains.
Sodium acetate, . . . . .	320 grains.

dissolve in seven fluidounces of distilled water. Sodium salicylate 480 grains; dissolve in seven fluidounces of distilled water; mix the solutions and wash the filter with sufficient distilled water to make fifteen fluidounces; to this add one fluidounce of glycerin.

The following formula for a somewhat similar preparation named *mistura sodii salicylatis*, originated by Dr. S. Solis Cohen, of this city, is used in the Philadelphia Hospital: Tincture of ferric chloride, 2 fl. oz.; sodium salicylate, 2

troyounces; citric acid, 40 grains; glycerin, 4 fl. ozs.; oil of gaultheria, 120 minims, and solution of ammonium citrate (B. P.), a sufficient quantity to make one pint.

In the American Journal of Pharmacy for 1886, page 534, is republished a formula, taken from Braithwaite's retrospect, an English journal, based upon the same reaction, but results in a much weaker preparation. A proprietary article has also been placed upon the market under the same name.

On motion adjourned.

T. S. WIEGAND, *Registrar*.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

*Philadelphia College of Pharmacy*.—The Junior course closed with the written examinations of the students, held on Thursday, March 9. The following questions were given out during the term:

### MATERIA MEDICA AND BOTANY.

(1) Describe a living cell with its contents. Explain the formation of new cells by division.

(2) What is meant by parenchyma tissue? Describe and illustrate by sketches some varieties of parenchyma. Also describe and illustrate different outgrowths of epidermal cells.

(3) What is a bud? At what point of the axis are buds produced? Explain the origin and development in length of the different parts of a bud.

(4) Explain by sketches and brief descriptions the arrangement of tissues as seen upon transverse sections of the following organs: (1) Stem of a monocotyledon; (2) stem of a dicotyledon; (3) root of a monocotyledon.

(5) Give the botanical names of the plants yielding *peppermint* and *spearmint*. State where each species is indigenous. By what characteristics would you distinguish the two drugs? Which yields menthol?

(6) Explain the characteristic structure of the *corolla* and of the *ovary* of the following orders: (1) *Aurantiaceæ*, (2) *myrtaceæ*, (3) *labiataë*. Name of each of these orders a plant yielding an officinal flower or flower bud.

### THEORY AND PRACTICE OF PHARMACY.

(1) Describe the method of taking the specific gravity of a solid body with a specific gravity bottle. Give a definition of specific gravity. State how you would make a fluidounce of a one per cent. solution of cocaine hydrochlorate in water.

(2) What influence has an atmosphere saturated with moisture upon the rapidity with which evaporation takes place, from a liquid placed in a dish in a confined space? Why are flat vessels chosen for pharmaceutical evaporating dishes? Does the degree of heat used in evaporation have any effect in deciding the proper shape of the vessels used in the laboratory for evaporation? Give the reason.

(3) Define the processes of filtration, clarification and decoloration. Write your name, examination number and your idea of the metric measure of the

diameter of the circular piece of filtering paper on your desk; then fold a plaited filter with it, and hand it in with your answers to the pharmacy questions.

(4) Describe three methods of separating immiscible liquids; mention the advantages of each method; illustrate each method with a sketch.

(5) Describe the processes of percolation, repercolation and percolation of sugar in making syrup.

(6) Name two official liquid preparations of ferric sulphate; state how each is prepared, omitting quantities, and give the uses of each.

#### CHEMISTRY.

(1) How is the fact that the atmosphere has pressure established? Describe the several forms of instruments for recording this pressure. Describe the air-pump and state its uses.

(2) Why does change of condition sometimes result when bodies are heated? What is meant by the latent heat of fusion and of vaporization? State practical applications of these principles.

(3) Describe the electrolysis of water, stating the results as fully as you can. When is an element called electropositive, and when electronegative? Illustrate by example.

(4) Write the reactions for the production of chlorine. Mention experiments illustrating the affinity of chlorine for other elements. Give the correct chemical name for compounds of chlorine with the metals. Give three examples.

(5) Describe the several physical modifications of the element *sulphur*. Under what names is sulphur described in the U. S. Pharmacopœia? What name do we give to compounds of sulphur with the metals? Give examples.

(6) Give the chemical formula of *Acidum Boricum* and *Sodii Boras*. Describe the occurrence of these compounds in nature. How would you proceed to prepare one of these preparations from the other?

#### EXAMINING COMMITTEE.

(1) State the official names of the two varieties of *rose petals*. Name two or more constituents contained therein. Mention the habitat of each variety. Name an official preparation of each variety.

(2) What is the formula for *sulphur dioxide*? How is it prepared? Give the physical and chemical properties of sulphur dioxide. What official acid is prepared from this oxide? What impurities does this acid frequently contain?

(3) The following ingredients are used in proportions given, in the preparation of official *camphorated tincture of opium*: Powdered opium, benzoic acid, camphor, oil of anise, of each  $\frac{1}{4}$  of one per cent.; glycerin, four per cent.; diluted alcohol, sufficient to make one hundred per cent. Write a formula, using metric weights, for fifteen kilograms of the tincture.

(4) Give a brief description of the processes of (1) filtration, (2) precipitation, (3) lotion, (4) expression and (5) percolation. Give the names of five official substances to obtain which the respective operations are employed.

#### OPERATIVE PHARMACY.

The purification and granulation of ammonium chloride, and the preparation of ointment of nitrate of mercury, and of suppositories of tannin with

cacao butter as the base, and without the use of moulds, constituted the work in this branch.

## SPECIMENS.

Anthemis,	Aqua Cinnamomi,	Alumen,
Chondrus,	Extract. Gentianæ Fluid.,	Liquor Sodæ chloratæ,
Sambucus,	Linimentum Chloroformi,	Zinci Sulphas,
	Syrupus Zingiberis.	

The examination of the Senior students commenced March 25, and terminated March 31, 1893. The subjects were as follows :

## MATERIA MEDICA AND BOTANY.

*A—Pareira brava*—State the botanical name of the plant yielding Pareira brava, and its native country. What part of the plant is recognized by the pharmacopœia? Describe the physical and structural characteristics of the drug. What other part of the same plant is sometimes mixed with the drug, and how may it be recognized? Name and describe some of the false Pareiras occasionally seen in the market, and state how they differ from the pharmacopœial drug. What other drugs are procured from the same natural order yielding Pareira, and what are the important constituents of each?

*B—Squill*—Name the plant yielding Squill, and state its habitat. What part of the plant is used, and how is it prepared for the market? Describe the drug as seen in the market; also its structure. What varieties of the drug are met with, and how do they differ? What causes irritation of the skin on handling squill? Name the medicinally active principles of the drug. Give the medical properties and doses of squill.

*C—Willowbark*—What plants yield this bark, and where are they indigenous? Give a description of willowbark, as recognized by the pharmacopœia. How does the bark from other parts of the same tree differ from the pharmacopœial willowbark? Give the approximate percentage of its important constituents. Give the outlines of a process for preparing the bitter principle. Also give the chemical characteristics of the latter, its medical properties and dose.

*D—Reticulate Leaves*—Which pharmacopœial leaves are distinctly reticulate? Give for each of these leaves the name of the plant and the chief constituents. How would you distinguish these leaves, both in the unbroken and broken condition?

*E—Arbor vitæ*—Name the plant, its habitat and natural order. How may the drug be distinguished from other similar drugs procured from the same order? Name the bitter and astringent principles, also the medical properties and dose of arbor vitæ. Name the plants and parts of plants of the same natural order yielding volatile oils consisting of hydrocarbons.

*F—Anise*—Give the botanical name, the natural order, and part of the plant used. Describe the appearance of the drug and its structure. Name the impurities occasionally present, including a poisonous drug, and state how they may be distinguished from anise. What amount of volatile oil is obtainable from anise, and what are its characteristic properties? Which tissue or part of star anise yields a similar volatile oil, and how does this differ



from the volatile oil of anise? Name some other drugs yielding volatile oils of similar composition.

*G—Quince Seed*—Name the plant yielding quince seed, and describe the drug. In what manner is the mucilage stored in the seed? Give the amount of mucilage obtainable from quince seed. Name some other seeds with mucilage stored in a similar manner. Name the pharmacopœial fruits and seeds (besides quince) procured from the order of Rosaceæ, and for each give the name of the parent plant and the main constituents of the drug.

*H—Fungi*—Name the pharmacopœial drugs of the class of Fungi. Describe for each, briefly, its development; also its characteristic appearance, as met with in commerce; and the best method of preservation. Name the supposed medicinally active constituents; and give the medical properties and doses of the drugs.

*I—Balsam of Peru and Balsam of Tolu*—Give for each of these drugs the name and habitat of the plant; the mode of production (in outline); the characteristic properties; the principal constituents, and tests for detection of impurities.

*K*—Describe the tests you would apply for distinguishing the following principles:

- (1) Quinine and morphine;
- (2) Strychnine and brucine;
- (3) Resin of scammony and resin of jalap.

How would you detect adulteration of

- (4) Powdered tragacanth with starch, and
- (5) Powdered acacia with dextrin.

#### THEORY AND PRACTICE OF PHARMACY.

*A*—How is official *Liquor Acidi Arseniosi* made? If *Liquor Acidi Arseniosi* contains thirty-seven grains of Arsenious Acid in eight fluidounces, what fraction exactly is there in half a fluidrachm? and How many 100 cc. bottles will be required to hold five litres of the above solution?

*B*—Give the unabbreviated official or Latin name, ingredients, brief outline of process, and a description of the appearance of *Norwood's Tincture*; *Basham's Mixture*; *Diachylon Plaster*; *Goulard's Cerate*; *Plummer's Pills*; *Elixir of Vitriol*; *Liver of Sulphur* and *Labarraque's Solution*.

*C*—Give the English name, ingredients, brief outline of process, and a description of the appearance of *Mistura Chloroformi*; *Liquor Arsenii et Hydrargyri Iodidi*; *Infusum Digitalis*; *Syrupus Pruni Virginianæ*; *Tinctura Cinchonæ Composita*; *Trochisci Sodii Bicarbonatis*; *Acidum Nitrohydrochloricum* and *Vinum Rhei*.

*D*—Describe the processes for preparing *Pyroxylin*, and *Glacial Acetic Acid*. Give the official name of each, and state the uses and properties of each.

*E*—Describe the process for preparing *Malt*. Describe the changes which take place in the constituents of the grain during the process of malting, and state what produces the changes. How is *Extract of Malt* made? Describe the appearance and properties of good *Extract of Malt*.

*F*—Give three methods of obtaining Glycerin. Which method is preferred? and give reasons. What liquid is used in medicine produced by the action of Nitric Acid on this liquid? In what form is the compound liquid usually prescribed? Give three names that are used in prescriptions for it.

*G*—What physical properties must a good pill mass possess? Give the reasons for each property mentioned. What is an excipient? Of the following excipients, water, glycerin and mucilage of tragacanth, describe the character of the ingredients of pills for which each excipient is best adapted. Illustrate by an example the use of each.

*H*—Criticise and correct the following prescriptions, if necessary stating what difficulties there may be in compounding and dispensing them, and how they would be remedied :

	Grm.
R Morph. Sulph.,	o   12
Atropia Sulph.,	o   06
<hr style="width: 100px; margin-left: 0;"/>	
M. ch. No. x.	
One every three hours.	

R Chloral hydrat., gr. xl.  
 Camph. pulv., gr. x.  
 Syr. Zingib., f ʒ ii.  
 Aquæ ad f ʒ ij.  
 M. ft. solut.

*I*—Examine the following prescriptions, and, if you would dispense them, state the proper method, explaining the difficulties, if any exist, and how they would be remedied :

R Quinin. sulph., gr. xx.  
 Sodii salicyl., ʒ iss.  
 Acid. sulph. dil., ʒ i.  
 Ag. fœniculi, f ʒ viij.  
 M. ft. solutio.

R Bismuthi subnit., ʒ i.  
 Sodii bicarb., gr. xxx.  
 M. ft. pil. No. xx.  
 S.—Take one after each meal.

*K*—Criticise and correct the following prescriptions, if necessary stating what difficulties there may be in compounding and dispensing them, and how they would be remedied :

R Pulv. opii, gr. xx.  
 Dr. J. H.

R Quinin. sulph., gr. i.  
 Morphin. sulph., gr. viij.  
 Ft. pilul. No. x.  
 S.—One pill every 3 hours.

#### CHEMISTRY.

*A*—Give an outline of the process for manufacturing Sulphuric Acid. How would you purify the commercial acid so as to obtain the *Acidum Sulphuricum*, *U. S. P.*? What is Nordhausen Sulphuric Acid, and how is it made?

*B*—Give the formula of *Calx Chlorata* and state how it is made. State how *Potassii Chloras* and *Sodii Chloras* are made. What are the most important pharmaceutical and technical uses of these several compounds?

*C*—Give the reactions for the production of *Sodii Carbonas* by the Leblanc process. Give the reactions for the production of the same compound by the Ammonia-Soda process. State how Sodium Hydrate is produced by a modification of the Leblanc process.

*D*—What are the chief ores of Zinc and how is the metal obtained from them? Mention the most important uses of Zinc and of its alloys. Give the names and formulas of the official salts of Zinc.

*E*—Give the chemical formulas of *Potassii Bichromas* and of *Acidum Chromicum*. State how the latter preparation is obtained from the former. Write the reaction for the reduction of Potassium Bichromate by Oxalic Acid in the presence of Sulphuric Acid. Write the corresponding reaction when free Hydrochloric Acid is used instead of Sulphuric.

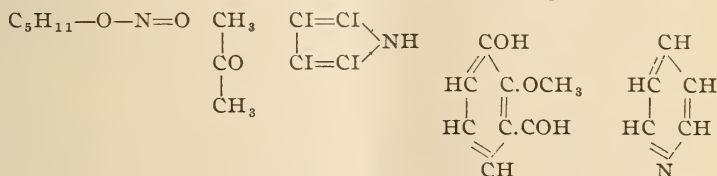
*F*—Write the graphic formulas of the two isomeric Propyl Alcohols. State the effects of oxidation upon each of these and describe the products of such oxidation.

*G*—To what class of organic compounds does *Glycerin* belong? From what natural sources is it extracted and by what several methods? Illustrate by reactions. Give the formula and name of the compound obtained by the action of strong Nitric Acid upon it.

*H*—Give the formula of *Acidum Salicylicum*. State the natural sources of it and how it is prepared from them. Write the reaction for its synthetic formation as now carried out. Give the formulas of Sodium Salicylate and of Salol.

*I*—Describe the appearance and properties of *Naphthalene* and state the sources from which it is obtained. What are some of the pharmaceutical and technical uses of Naphthalene? Write the graphic formula of  $\beta$ -Naphthol.

*K*—Give the correct chemical names for the following :



#### EXAMINING COMMITTEE.

*A*—What are *Volatile Oils*? Name the two most important classes of volatile oils. Of what two principles do volatile oils proximately consist? What is the most characteristic feature of volatile oils? Describe two methods by which volatile oils may be obtained, with an example of an oil obtained by each process. How may the adulteration of volatile oils by a fixed oil be detected? How may the presence of alcohol be shown? What is the source of *Oil of Origanum*? What is the chemical synonym for *Oil of Gaultheria*? Name a volatile oil produced by chemical action in the presence of water.

*B*—What is the commercial source of *Ammonium Salts* or Compounds? How is commercial *Ammonium Chloride* purified? How is *Ammonia* Gas made from it? In what two forms is ammonia gas officially recognized? Give the percentage of gas in each preparation. How is *Ammonium Carbonate* made? What is its chemical composition and formula in symbols? What change takes place in the official ammonium carbonate on exposure to air?

*C*—From what sources are *Tannic* and *Gallic Acids* prepared? What chemical relation exists between gallic and tannic acid? Give an outline of

the process for preparing tannic acid. Give an outline of the process for preparing gallic acid. How can gallic acid be distinguished from tannic acid chemically? How can gallic acid be distinguished from tannic acid microscopically? Name two substances that are incompatible with tannic acid. Name two substances that are incompatible with gallic acid.

*D—Calabar Bean.* Give the official name. Give the botanical name of the plant yielding it. Where is this plant indigenous? What two names have been given to the active principle of calabar bean? What salt of the active principle is official? What is the dose of this salt? What preparations of Calabar bean are official? What menstruum is used to exhaust the bean? Give the dose of each preparation. What are the medical properties of Calabar bean?

*E—*Give the process for the preparation of *Solution of Citrate of Potassium*. Give its official title. Why should it be freshly made? Give the process for the preparation of *Neutral Mixture*. Give its official name. To what chemical salt do these preparations owe their activity?

*F—*Write the reaction of *Ammonium Sulphide* on *Alum*. Write the reaction of ammonium sulphide on *Ferric Chloride*. What is the chemical formula for *Ferric Hydrate*? For what purpose is ferric hydrate used in medicine? Give the physical and chemical differences between ferrous hydrate and ferric hydrate.

*G—*How many pounds of absolute alcohol are contained in 202 pounds of alcohol of sp. gr. .928 at 60° F.? Show *all* figures used in obtaining your answer.

Translate the following Latin terms used in prescription writing: Cola, Cochleare parvum, Dentur tales doses No. vi, Fiat Collyrium, Mica Panis, Q. S., Cyathus vinarius, Fiat Pulvis et divide in chartulas xv, Deaurentur Pilulas, āā, R.

*H—*What are the Latin names and ingredients of the following preparations: Brown Mixture. Turlington's Balsam. Griffiths' Mixture. Black Draught. Black Wash. Yellow Wash. Fowler's Solution. Compound Effervescent Powder. James' Powder. Dewees' Carminative.

*I—*Copy the following formula, indicating the proper quantity of each ingredient to make two fluidounces of a ten per cent. emulsion of Oil of Turpentine, and one per cent. of Oil of Wintergreen. Explain the manner in which it should be made.

R Oleum Terebinthinæ.  
Oleum Gaultheriæ.  
Pulvis Acaciæ.  
Aqua Menthæ Piperitæ.

How would you dispense the following prescription? Give full details of your method of proceeding:

R Quin. Sulph., gr. xxx.  
Ferri Pulv., gr. xx.  
Acidi Arseniosi, gr. ij.  
Atropiæ, gr.  $\frac{1}{40}$ .  
Nitro glycerini, m $\frac{1}{10}$ .



*K*—Criticise the following prescription. State whether you would compound it. Are the ingredients incompatible? State what action takes place, if any. How would you dispense?

R Morph. Sulph., gr. ij.  
 Potass. Bicarb., gr. xc.  
 Aquæ q. s. ft. f ̄ ij.

SIG.—Take a teaspoonful mixed with half a teaspoonful of lemon-juice.

What would be a proper dose for the following prescription? How would you compound it?

R Morph. Sulph., gr. viij.  
 Ac. Sulph., m̄j.  
 Aq. Dest., f ̄ ss.  
 Ol. Menth. Pip.  
 Ol. Anisi, āā m̄x.  
 Ac. Hydrocyan. Dil., m̄xliv.  
 Chloroform., f ̄ ss.  
 Spt. Rectificat. q. s. ft. f ̄ ij.  
 M. ft. Mist.

#### SPECIMENS.

Aconitum.	Aq. amygdal. amar. Ammon. chlorid.	Acid. Gallicum.
Calumba.	Extr. Pruni virg. fl. Amylum.	Benzoinum.
Colchici semen.	Liq. Ferri tersulph. Aqua Chlorig.	Gentiana.
Cornus.	Massa Hydrargyri. Liq. Sodæ Chloratæ.	Linim. Chloroformi.
Fœniculum.	Mist. Fer. et Am- Magnes. sulphas.	Magnes. ponderosa.
Rosmarinus.	mon. acet. Potass. bicarbonas.	Pulv. Glycyrrh. comp.
Santalum rubr.	Sodii salicylas. Potass. chloras.	Pulv. Ipecac. et Opii.
Santonica.	Spir. Æther. nitr. Potass. nitras.	Sinapis nigra.
Uva Ursi.	Spir. Junip. comp. Sodii acetas.	Sulphur præcipit.
Xanthoxylum.	Syr. Acidi Hydriod. Zinci sulphas.	Tinct. Myrrhæ.
	Tinct. Gentianæ	
	comp.	

#### OPERATIVE PHARMACY.

##### *Granulated Salt.*

Benzoic Acid, . . . . . 100 gr.  
 Sodium Carbonate, Pure, . . . . . 120 gr.  
 Make Sodium Benzoate, put in a wide-mouth bottle.

##### *Suppositories.*

Extract. Stramonii,  
 Acid Tannic., . . . . . āā gr. vi.  
 Ol. Theobromæ, . . . . . gr. c.

Make six suppositories by rolling.

*Emulsion.*

Yolk of One Egg,  
Cod Liver Oil,  
Water, of each a sufficient quantity.

Make four fluidounces of an emulsion containing fifty per cent. of Cod Liver Oil.

*Ointment.*

Camphor, . . . . . 5 gr.  
Olive Oil, . . . . . 1 fl. dr.  
Solution of Subacetate Lead, . . . . . 2 fl. dr.  
Cerate, . . . . . 400 grains.

*Plaster.*

Spread a Burgundy Pitch Plaster 4 x 6 inches.

## ANALYTICAL CHEMISTRY.

The qualitative analysis of various solutions was required, containing several metals in combination with inorganic organic acids.

Ten candidates with the grade "very satisfactory" in materia medica were entitled to participate in the examination of histology, for which the following specimens were used: Cuticle of leaf of Agave, longitudinal section of frond of Aspidium, and the following transverse sections of roots of *Cicuta maculata*, *Smilacina racemosa*, *Apocynum cannabinum* and *Stillingia sylvatica*; bark of *Salix fragilis*; fruits of *Carum Carui* and *Chærophylum procumbens*; and seed of *Datura Stramonium*.

The following list contains the names of the successful candidates entitled to receive the diploma at the annual commencement, and includes the names of those having previously passed the examinations and during the past year completed their terms of service; the titles of the theses presented by the candidates are also appended.

James Duffield Adams, New Jersey, Uranium.  
Winfield Scott Adams, Pennsylvania, Cimicifuga.  
Frank Alleman, Pennsylvania, Antiseptics.  
Frank John Althouse, Pennsylvania, Liquor ammonii acetatis.  
Henry Peter Arnold, Pennsylvania, Lac sulphuris.  
George Hulings Atkins, Delaware, Rhamnus Purshiana.  
Bismarck Henry Balle, South Carolina, Salicylic acid compared with other antiseptics.  
Samuel Dey Bennett, New Jersey, Oleum morrhuae.  
Watson J. Berkstresser, Pennsylvania, Ethylic alcohol.  
Robert Gillingham Blow, New Jersey, Alkaloids.  
Jacob Boadway, Canada, Benzoic acid.  
William Frank Bowman, Pennsylvania, Fabiana imbricata.  
John Samuel Boyd, Delaware, Ointments.  
William Nathaniel Bradley, Pennsylvania, Unguentum aquæ rosæ.  
Herman Adam Brickner, New York, Percolation.

- Edmund Lee Brown, Missouri, *Andromeda ligustrina*.  
 Charles Monroe Butcher, West Virginia, *Potassii bitartras*.  
 Albert Reid Calhoun, Pennsylvania, *Maltum*.  
 Theodore Campbell, Pennsylvania, *Vanilla*.  
 Howard Preston Carpenter, Delaware, *My ideal pharmacy*.  
 Charles Robert Carson, Illinois, *Camphor*.  
 Herbert Gent Carter, Pennsylvania, *Medicated waters, syrups and tinctures*.  
 Albert Arthur Chance, Maryland, *Sugar refining*.  
 Simmons Lee Cheek, Alabama, *Gossypium*.  
 William Gorgas Clark, Pennsylvania, *Abstracts*.  
 William Edward Cline, Pennsylvania, *Nux vomica*.  
 Edward Smith Collins, Delaware, *Cocaine*.  
 Samuel Harry Conover, Pennsylvania, *Pressure percolation*.  
 Harry Thompson Copeland, Pennsylvania, *Oleum morrhue*.  
 Linwood Shamgar Corson, New Jersey, *Aluminium*.  
 Harry Lehman Cox, Pennsylvania, *Tinctura zingiberis*.  
 Russell LeVan Coxe, Pennsylvania, *Extract of vanilla*.  
 Harry Roscoe Cushen, Maryland, *Oil of wintergreen*.  
 Harry Hyman Dancy, North Carolina, *Petrolatum*.  
 Frederick Dannenhauer, Pennsylvania, *Basham's mixture*.  
 Benjamin Franklin Davis, Pennsylvania, *The practical pharmacist*.  
 George Warren Davis, Pennsylvania, *Cardamom*.  
 William Lewis Deen, Pennsylvania, *Coal tar products in pharmacy*.  
 John Wolfersberger Deininger, Pennsylvania, *Phosphorus*.  
 George Ludwig Dengler, Pennsylvania, *Tests for tannin*.  
 William Penn Detwiler, Pennsylvania, *Aqua ammoniæ*.  
 Harry Daniel Dietrich, Pennsylvania, *Maltum*.  
 Charles Schaeffer Donough, Pennsylvania, *Phytolaccæ radix*.  
 George Francis Drever, Minnesota, *Value of pharmaceutical education*.  
 Luther Albert Driesbach, Pennsylvania, *The new antipyretics*.  
 Harry Pickering Eisenhart, Pennsylvania, *Sapo*.  
 Paris Foster Elm, Pennsylvania, *Cleaning druggists' utensils*.  
 William Wallace Eshbach, Pennsylvania, *Taraxacum*.  
 Thomas Addison Fessler, Pennsylvania, *Sugar coated pills*.  
 Josiah Hodgkinson Furman, Pennsylvania, *Spices and their adulterants*.  
 Charles Goos, Pennsylvania, *Caffein*.  
 Owen Lovejoy Guest, New Jersey, *Lard*.  
 Harry Cornish Hadley, Pennsylvania, *Erythroxyton*.  
 Mae Thompson Harders, Pennsylvania, *Menstruum for fluid extract menispermum*.  
 Susannah Garrigues Haydock, Pennsylvania, *Saccharum*.  
 Franklin Jacob Heckler, Jr., Pennsylvania, *Walnut hulls*.  
 William Joseph Heim, Pennsylvania, *Cortex sambuci*.  
 Oscar Edwin Henritz, Pennsylvania, *Pills and excipients*.  
 Walter Hayes Hersey, Delaware, *Citrine ointment*.  
 Thomas Elwood Hickman, Pennsylvania, *Percolation*.  
 William Hilpert, Pennsylvania, *Honey*.  
 Samuel Wisler Hinkle, Pennsylvania, *Gossypium*.  
 David Hamilton Holcombe, New Jersey, *Suppositoria*.

- Ernest Charles Jaeger, Missouri, The genus *Vitis* and its chief product.  
 Rudolph Alexis Kalenborn, Washington, *Rhamnus Purshiana*.  
 William Kearns, Pennsylvania, Metric system.  
 Edgar Cyrus Keefer, Pennsylvania, Suppositories.  
 Edwin Russell Kennedy, Ohio, Powdered opium.  
 Joseph Samuel Kinsey, Ohio, Assayed *Erythroxylon Coca*.  
 Harry C. Kirchhoff, New Jersey, Relations of pharmacist and physician.  
 John Hammond Kirk, Pennsylvania, Aluminium.  
 Harry Joseph Kline, Pennsylvania, Powdered opium.  
 Edgar T. Knoop, Ohio, Malt.  
 Harry Warren Koch, Pennsylvania, *Ceratum cantharidis*.  
 David George Kocher, Pennsylvania, *Euphorbia pilulifera*.  
 Albert Koenig, Pennsylvania, Bismuth.  
 Albert Charles Koeppen, South Dakota, *Epiphegus virginiana*.  
 Charles Kohler, Pennsylvania, Extent of adulteration and sophistication of drugs.  
 Abraham Francis Kottcamp, Pennsylvania, Glycerin suppositories.  
 Ray Weaver Kottka, Pennsylvania, Distillation and its products.  
 Jerre Ray Kramer, Pennsylvania, Resin of *podophyllum*.  
 David Kunkel, Pennsylvania, Pills and excipients.  
 C. Eugene Lack, Pennsylvania, *Hydrargyrum*.  
 Henry Adolph Laessle, Pennsylvania, *Euphorbia Ipecacuanha*.  
 William Robinson Lamar, Georgia, The tannin of *Krameria triandra*.  
 George Taylor Lambert, Pennsylvania, Alkaloids.  
 Charles Herbert Lawall, Pennsylvania, *Gaultheria*.  
 George Dodson Leh, Pennsylvania, Ointments.  
 Sylvester W. Leidich, Pennsylvania, Acetanilid and antikamnia.  
 Louis Leix, Pennsylvania, Syrups by cold percolation.  
 Max Lippmann, New York, *Caulophyllum thalictroides*.  
 Charles Peter Loeper, Pennsylvania, *Eucalyptus*.  
 Howard Edgar Long, Pennsylvania, Camphor.  
 Ivy Forman MacNair, North Carolina, *Coca*.  
 Frederick William Meink, Ohio, Analysis of coffee.  
 Joseph Adolph Meller, Illinois, Tobacco.  
 Harvey H. Mentzer, Pennsylvania, The antipyretics.  
 Robert Merrifield, Pennsylvania, *Viscum flavescens*.  
 George Franklin Metzger, Pennsylvania, The successful pharmacist.  
 Louis Joseph Meyers, Pennsylvania, Suppositories.  
 Byron Amzy Mintonye, Illinois, A pharmacy.  
 William Joseph Monaghan, Pennsylvania, *Kalmia latifolia*.  
 Charles Henry Morris, Pennsylvania, *Liquor magnesii citratis*.  
 Harry Kempton Mundorf, Pennsylvania, Compressed pills.  
 Robert McFarland, Pennsylvania, *Stramonii semen*.  
 Raphael McLaughlin, Pennsylvania, Mexican valerian.  
 Robley Dunglison Newton, Pennsylvania, *Iris versicolor*.  
 Albert Spencer Nichols, New York, The history of compressed tablets in America.  
 Edward John Noon, Pennsylvania, Education in pharmacy.  
 George Lambert Paullin, New Jersey, Ointments.



- Elmer May Paxson, Pennsylvania, Volumetric assay of iodine.  
 William Edward Peabody, West Virginia, Petroleum.  
 William Quin Pettyjohn, Illinois, Mercurial ointment.  
 John Arthur Powders, Pennsylvania, Erythroxyton.  
 Howard F. Pyfer, Pennsylvania, Cleanliness in pharmacy.  
 Michael Jenkins Quattlebaum, South Carolina, *Chionanthus virginica*.  
 Edward Augustine Reap, Pennsylvania, *Lippia mexicana*.  
 Oras Reed, New Jersey, Assay of belladonna.  
 William Howard Reeser, Pennsylvania, Unguentum aquæ rosæ.  
 Wayne Schaeffer Regar, Pennsylvania, Balsamum Dipterocarpi.  
 Jacob H. Rehfuess, Ohio, Suppositories.  
 Vivian Ivanhoe Reid, Kansas, *Triosteum perfoliatum*.  
 Ernest Reif, Pennsylvania, *Rosmarinus*.  
 Thomas Jackson Rice, Virginia, *Gossypium herbaceum*.  
 William McKinstry Rickert, Pennsylvania, Pills.  
 Charles Heber Riegel, Pennsylvania, *Stramonium*.  
 Louis Robeckek, Ohio, *Narcissus orientalis*.  
 Rees Conard Roberts, Pennsylvania, Plant fertilization.  
 William Franklin Robertson, Texas, *Gossypium herbaceum*.  
 Otto Moyer Ruete, Iowa, *Arnica* flowers.  
 Oscar Gustav Ruge, Illinois, *Acetanilid*.  
 John Louis Sahn, Louisiana, *Arnica* root.  
 Victor Daniel Scheirer, Pennsylvania, Glycerin and its relation to pharmacy.  
 Bernhard Frederick Scherer, Pennsylvania, *Extractum glycyrrhizæ depuratum*.  
 Charles Franklin, Schmickle, Pennsylvania, Hydrochlorate of cocaine.  
 George John Schnuerer, Ohio, *Cynoglossi folia*.  
 James Ireland Scull, New Jersey, Strontium.  
 Frank Morris Seiffert, Pennsylvania, Syrups.  
 Edward C. Sellen, Iowa, Salicylic acid.  
 William Gooding Shallcross, Maryland, Chloroform.  
 William Walls Sharp, Delaware, Opium smoking.  
 John Ware Sheppard, New Jersey, Ancient pharmacy.  
 Howard Joseph Siegfried, Pennsylvania, Review of a thousand prescriptions.  
 Robert Wilson Smink, Pennsylvania, Some qualitative analyses.  
 D. Evans Smith, New Jersey, Petroleum.  
 Willis Lanius Smyser, Pennsylvania, Squill.  
 Clara Sprissler, Pennsylvania, *Eucalyptus globulus*.  
 Lawrence Albertson Stanger, Pennsylvania, Iron.  
 Laurence Sylvester Stedem, Ohio, Jambul.  
 John Wesley Steele, Pennsylvania, Vegetable fibre.  
 Frederick Eugene Steere, Virginia, Cranberries.  
 Harry Smoyer Steltz, Pennsylvania, *Spiritus ammoniæ aromaticus*.  
 John Stewart, Pennsylvania, Camphora.  
 James Pennington Stratton, New Jersey, Hydrogen peroxide.  
 Clement Bryant Stroup, Pennsylvania, Fermentation.  
 Benjamin Spangler Thompson, Pennsylvania, *Prunus virginiana*.  
 Joseph Brinton Thompson, Pennsylvania, *Taraxacum*.  
 William Winebert Troop, Pennsylvania, Essential qualifications of a pharmacist.

Elliot Davis Truman, New York, *Juglans cinerea*.

Harvey Milton Ueberroth, Pennsylvania, Analysis of proprietary headache powders.

Walter Horace Umstead, Ohio, *Smilacina racemosa*.

Philip Henry Utech, Pennsylvania, *Resina sumbul*.

Thomas Franklin Van Buskirk, Pennsylvania, *Lippia mexicana*.

Jacob Harrison Vogelbach, Florida, *Serenoa serrulata*.

John Kirby Wachtel, Indiana, *Erythroxylon*.

Charles Wesley Wagner, Pennsylvania, *Chocolate*.

Harry Hurley Walton, Pennsylvania, *Arsenic*.

Frank John Walz, Pennsylvania, History of pharmacy.

Frank Nicholas Weber, New Jersey, *Boroglyceride*.

Ira Randolph Wehler, Pennsylvania, Sunday observance.

Frank Ellison Whitman, Pennsylvania, *Saccharum*.

Richard Powers Wilkinson, Pennsylvania, Surgical antiseptics.

Herbert Forrest Williams, Pennsylvania, *Baptisia*.

Julius Wohlgemuth, Pennsylvania, *Ipecacuanha*.

Benjamin Franklin Wolfenden, Pennsylvania, Fluid extract of *pulsatilla*.

Charles Adam Zeller, Pennsylvania, How to be a successful pharmacist.

Howard Milton Zimmermann, Pennsylvania, *Tinctura opii deodorata*.

#### STATES AND COUNTRIES REPRESENTED BY THE GRADUATING CLASS.

The members of the graduating class came from the following States: 1 each from Alabama, Canada, Florida, Georgia, Indiana, Kansas, Louisiana, Minnesota, South Dakota, Texas and Washington; 2 each from Iowa, Missouri, North Carolina, South Carolina, Virginia and West Virginia; 3 from Maryland; 4 from New York; 5 from Illinois; 6 from Delaware; 9 from Ohio; 14 from New Jersey; 113 from Pennsylvania; total number, 177.

In response to the invitation extended by the faculty, the graduating class and the officers and trustees of the College on the evening of Wednesday, April 19, sat down to the professors' supper in the Museum Hall of the new building, which was handsomely decorated. In the course of the evening, the President of the Zeta Phi Society, Mr. Shallcross, presented to the College, on behalf of the Society, three handsome chairs, which were accepted for the College by Mr. Perot, chairman of the Board of Trustees, and were at once put to use by Professors Maisch, Remington and Sadtler. With brief addresses made by the president, professors and several officers of the College, and by a number of the graduates, the hours passed rapidly, enlivened by songs from the College Glee Club, and this final class reunion terminated to the satisfaction of all present.

Thursday, April 21, was commencement day. A heavy rain-storm continued, with few interruptions, all day, but in spite of the unfavorable conditions of the weather, a large and attentive audience greeted the graduating class in the evening at the Academy of Music. On this occasion seats were provided for the graduates upon the stage, they entering through the parquet at 8 o'clock. President Charles Bullock conferred the degree of Graduate in Pharmacy upon the candidates named above, after which the prizes were awarded.

Honorable mention was made of the following, who had attained the grade distinguished in the final examinations: W. R. Lamar, J. H. Reh fuss and P. Utech; and with the grade meritorious: S. D. Bennett, W. P. Detwiler, R. A. Kalenborn, E. B. Kennedy, G. F. Metzger and R. W. Smink. The materia medica prize, a Zentmayer histological microscope, was presented to W. H. Umstead for histological work done on the subterraneous parts of *Smilacina racemosa* and *Polygonatum biflorum*, and honorable mention was made on similar creditable work by H. A. Laessle. The Analytical Chemistry prize of \$25, offered by Professor Trimble for original chemical work, was awarded to F. W. Meink. The John M. Maisch prize of \$20, offered by Mr. J. H. Red-secker, of Lebanon, Pa., for histological knowledge of plants and drugs, was carried off by W. R. Lamar, and honorable mention was made of S. D. Bennett, W. P. Detwiler, C. L. Donough, R. A. Kalenborn, H. H. Koch, E. R. Kennedy, G. F. Metzger, J. H. Reh fuss and P. Utech. The Operative Pharmacy prize of \$25, offered by Mr. E. L. Boggs, of Charleston, W. Va., for the best examination in operative pharmacy was awarded to P. F. Elm; the Theoretical Pharmacy prize, a prescription balance, offered by Mr. H. J. Maris, of Philadelphia, for the best examination in theoretical pharmacy, to P. H. Utech, and the Robinson prize, a gold medal and certificate offered by Jas. S. Robinson, Ph.G., of Memphis, Tenn., for the best examination in both general and analytical chemistry, to W. R. Lamar.

The valedictory address to the graduating class, delivered by Prof. J. P. Remington, was replete with sound advice and happy suggestions. As usual, the exercises of the evening were enlivened with music, Hassler's orchestra having been engaged for the evening, and at the close the graduates proceeded to the green room, where the flowers and other presents sent by friends of the graduates had been collected together, and were distributed to those for whom they were intended. For some years past, we have noted the rapid decline of the former interest in the custom of distributing such presents in public, and its cessation has now been attained.

It should be placed on record yet, that the invitation cards gotten up by the Zeta Phi Society for this commencement were exceedingly elaborate and artistically executed in five leaves held together by blue and white silk ribbons, and showing engravings of the new College building, invitation to the Alumni reception on Tuesday, invitation to the commencement on Thursday, portraits of Professors Maisch, Remington, Sadtler and Trimble, and the names of the class officers alongside of a representation of the colossal statue of William Penn, which, for some months, has been on exhibition in the court-yard of the Public Buildings, and there during a night of the preceding winter was decorated with the College colors by two members of the present graduating class.

*Alumni Association Philadelphia College of Pharmacy.*—On the evening of April 17, a reception was given to the graduates of former years and their friends in the Museum Hall of the new College Building, with the view of inspecting the improvements made during the past year. The exercises were opened by some introductory remarks by C. Carroll Meyer, Class '73, the president of the Association, who was followed by the chairman of the Committee on Arrangements, J. W. England, cl. 1883, whose remarks related to "our association, its origin and work." Short addresses on the subjects named

were afterward made as follows: "Our College," by Ch. Bullock, cl. 1847, president of the College; "our graduates as legislators," by G. W. Kennedy, cl. 1869, member of the legislature of Pennsylvania; "our graduates as professors," by Prof. J. P. Remington, cl. 1866; "our graduates as physicians," by Dr. A. W. Miller, cl. 1862; "our graduates as manufacturers," by Benj. F. Fairchild, cl. 1872, now of New York; "our graduates as pharmaceutical journalists," by Caswell A. Mayo, cl. 1887, editor of the *American Druggist*, and "our graduates in State Associations," by Jos. L. Lemberger, cl. 1854, treasurer of the Pennsylvania Pharmaceutical Association since its organization in 1879. After a few remarks by two or three other speakers, the company was invited to proceed to the large examination room on the fifth floor, where light refreshments had been provided, and opportunity was offered for friendly conversation.

The annual meeting of the Alumni Association was held in Alumni Hall, in the new College building, April 18, when after the transaction of routine and other business the following officers were elected: president, David H. Ross, cl. 1878; vice-president, Wm. L. Cliffe, cl. 1884, and J. S. Beetem, cl. 1878; treasurer, E. C. Jones, cl. 1864; secretary, Wm. E. Krewson, cl. 1869; corresponding secretary, Dr. J. L. D. Morison, cl. 1888; trustee of the sinking fund, Thos. S. Wiegand, cl. 1844; members of the executive board—Wallace Procter, cl. 1872; C. C. Meyer, cl. 1873; W. A. Bullock, cl. 1886; H. L. Stiles, cl. 1885, and Jos. C. Perry, cl. 1891, the latter to serve for an unexpired term of two years.

The reception to the Graduating Class took place in Association Hall on the evening of April 18, when the certificates of membership were presented to the newly elected members. Wm. R. Lamar, Augusta, Ga., was the recipient of the Alumni Gold Medal, awarded for highest average in general examination, and certificates were presented for best examination in one branch to J. H. Rehfuß, Eaton, O., in materia medica; P. H. Utech, Meadville, Pa., in theoretical pharmacy; G. J. Schnuerer, Cleveland, O., in chemistry; G. F. Metzger, Bethlehem, Pa., in general pharmacy; P. F. Elm, Shippensburg, Pa., in operative pharmacy; E. R. Kennedy, Zanesville, O., in analytical chemistry, and J. S. Kinsey, New Philadelphia, O., in specimens. R. L. Lloyd, Philadelphia, was awarded a certificate for the best collection of indigenous plants; Chas. C. Manger, Boonville, Mo., one for best examination in junior class, and Herman Harms, Salt Lake City, Utah, a special certificate for meritorious examination, especially in materia medica.

The class oration was delivered by Howard F. Pyfer, Lancaster, Pa.; the history of the class was delineated by E. R. Kennedy, Zanesville, O., and its future predicted by G. L. Paullin, Shiloh, N. J. Certificates for microscopic work were awarded to C. S. Donough, W. R. Lamar, H. R. Hess, H. Harms, J. A. Meller, O. M. Ruete, J. Kenworthy, H. T. Thayer, J. L. Sahm, J. W. Sheppard, G. J. Schnuerer and J. S. Kinsey.

*Maryland College of Pharmacy.*—The forty-first annual commencement was held on the afternoon of Friday, April 21, at Harris' Academy of Music, Baltimore, when President Louis Dohme conferred the degree of Graduate in Pharmacy upon the following candidates: Fred. Andriessen, Maryland; Harvey G. Beck,\* Pennsylvania; Charles M. Benson, Maryland; Frederick J. Boerner, Maryland; Albert J. Bossyns, New York; J. Edward Broadbelt, Jr., Maryland;



Louis Burger, Maryland; Charles McG. Cowan, Tennessee; William F. Dunn, Delaware; William Duvall, Maryland; David R. Evans, Louisiana; John Virgil Eubanks, North Carolina; Edward Thomas Hargrave,\* Virginia; Howard M. Harrod, Maryland; Eugene Withers Hodson, Maryland; Alexander Kammer, Maryland; George Keene, Maryland; Albert E. Kilner, England; John J. Keene, Maryland; William Leffler, Maryland; Richard C. McCleary, Maryland; Alphonse McLaughlin, North Carolina; Jacob Lee Mayer, Maryland; Walker Moore, Alabama; Francis Joseph Powers, Maryland; Thomas Reed, Texas; John J. Remsburg, Maryland; Harry A. Reindollar, Maryland; Henry Schmidt, Maryland; George Henry Schwinn,\* Maryland; James R. Stafford, Texas; Quevenne Jerome Stout, Tennessee; James Pinkney Stowe,\* North Carolina; J. Harry Stutt, Maryland; Thomas H. Wildsmith, Pennsylvania; George Arthur Wilford, Pennsylvania; J. Warren Wills, Virginia; Harry L. Whittle, Virginia.

Prizes consisting of gold medals were awarded to those marked (\*), Mr. Beck receiving two such prizes. The junior class gold medal was carried off by W. B. Carpenter. Rev. J. E. Grammer, D.D., delivered an address to the graduates.

Notice of the commencements of the following schools of Pharmacy has been received:

*Albany College*.—March 12, in Germain Hall, with seventeen graduates.

*Atlanta College*.—March 3, in De Give's Opera House, with four graduates.

*Brooklyn College*.—May 2, at Young Men's Christian Association Hall.

*Buffalo University*.—May 2, in Music Hall, with twenty-one graduates.

*Chicago College*.—April 13, in Hooley's Theatre, forty-six graduates.

*Cleveland*.—Eleven graduates.

*New York College*.—April 26, at Carnegie Music Hall, one hundred and five graduates.

*Northwestern University*.—February 16, with forty-one graduates.

*Purdue University*.—March 14, at the University Hall.

*St. Louis College*.—April 20, at Memorial Hall, forty-six graduates.

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## EDITORIAL.

*The Seventh International Pharmaceutical Congress*.—The officers of the American Pharmaceutical Association have recently sent out invitations to participate in the deliberations of this Congress, enclosing at same time the announcement of object, organization and program, as finally prepared by the Committee appointed at the Profile House in July last. This announcement is as follows:

(1) The International Pharmaceutical Congress called to convene in Chicago, August 21, 1893, during the progress of the World's Columbian Exposition, will be the seventh in the series of International Pharmaceutical Congresses, and the first held in America.

In addition to the invitation extended by the American Pharmaceutical Association to the International Pharmaceutical Congress to hold its next meeting in 1893 in Chicago, a proposal was also made by the World's Congress Auxiliary of the World's Columbian Exposition to the pharmacists of the

world, inviting them to participate in the Columbian commemoration by a convention similar in scope to the other world's congresses to be held at the same time and place, the proceedings of which will, in part, be devoted to addresses and papers of a general and popular character, including brief reviews of the progress made since the days of Columbus. It was, however, deemed desirable that there shall be but one pharmaceutical congress held this year, and that the scope and objects of the proposed World's Congress of Pharmacists and those of the Seventh International Pharmaceutical Congress be merged, and to attain this end the World's Congress Auxiliary accordingly proposed that the programme of the International Pharmaceutical Congress at Chicago include addresses and papers of a historical nature, and afford opportunity for the presentation of such other topics of a general interest as may, in the judgment of the Committee on Arrangements, be appropriate to the occasion. This proposal having been agreed to, the International Pharmaceutical Congress will be the only world's congress of pharmacists held in Chicago during the Exposition season.

The general scope and objects of the International Pharmaceutical Congress will be to stimulate pharmaceutical progress, to discuss the status of pharmacists and promote an intelligent appreciation of the work they do, and to consider matters and measures affecting the further advancement of pharmacy and a nearer approach to international agreement in education and practice.

(2) A Committee on the International Pharmaceutical Congress has been appointed by the American Pharmaceutical Association to arrange the preliminaries. This Committee on Arrangements consists of Oscar Oldberg, Chicago, Chairman; N. Gray Bartlett, Chicago; C. Lewis Diehl, Louisville, Ky.; D. R. Dyche, Chicago; Albert E. Ebert, Chicago; C. T. P. Fennel, Cincinnati, O.; J. M. Good, St. Louis, Mo.; C. S. N. Hallberg, Chicago; L. C. Hogan, Chicago; J. N. Hurty, Indianapolis, Ind.; J. Kochan, Denver, Col.; E. Kremers, Madison, Wis.; A. L. Metz, New Orleans, La.; Charles Mohr, Mobile, Ala.; E. L. Patch, Boston, Mass.; A. B. Prescott, Ann Arbor, Mich.; Charles Rice, New York, N. Y.; E. H. Sargent, Chicago; William Saunders, Ottawa, Can.; L. E. Sayre, Lawrence, Kan.; William M. Searby, San Francisco, Cal.; William Simon, Baltimore, Md.; William Simpson, Raleigh, N. C.; William S. Thompson, Washington, D. C.; together with Joseph P. Remington, Philadelphia, Pa., President of the American Pharmaceutical Association, and John M. Maisch, Philadelphia, Pa., Permanent Secretary of the American Pharmaceutical Association.

All who intend to participate in the Congress or to be represented or present in its meetings, and all invited guests, are requested to communicate in advance, and, if possible before July 1, their names and addresses to Oscar Oldberg, Chairman of the Committee, 2421 Dearborn Street, Chicago.

All papers, reports, and communications to be read at the Congress will, as far as possible, be printed in advance, in order that copies may be distributed at the meeting. For this purpose, such papers, reports, and communications must be placed in the hands of the Permanent Secretary of the American Pharmaceutical Association, John M. Maisch, 145 N. 10th Street, Philadelphia, before July 20. If received later, the printing in advance of the meeting cannot be promised.

(3) The Congress will be constituted of delegates accredited for that purpose

by the governments of the different countries, the pharmaceutical societies and examining boards, the colleges and schools of pharmacy, the pharmaceutical departments of universities, and the national pharmacopœial committees or commissions, respectively, each of which bodies will be entitled to be represented by three delegates.

(4) Special invitations are extended to pharmaceutical teachers, authors, leaders in the pharmaceutical profession, and pharmacists generally, to seats in the Congress.

(5) When a vote shall be taken upon any question upon which the yeas and nays shall be called, only duly accredited delegates shall be entitled to vote.

(6) The officers of the Congress shall consist of a President, Vice-President, a Secretary, and three Vice-Secretaries. The Committee on Arrangements shall act as a nominating Committee, and shall nominate the officers by ballot. The number of Vice-Presidents to be nominated shall be determined by the Nominating Committee.

(7) The first session of the Congress will be opened at 9 o'clock A.M., on Monday, the 21st day of August, 1893, in the Memorial Art Palace, Chicago, in which commodious halls and accommodations have been placed at the disposal of the Congress through the courtesy of the World's Congress Auxiliary of the World's Columbian Exposition.

The Congress will be opened with appropriate ceremonies, official addresses of welcome, and a report of the Committee on Arrangements. A temporary organization will then be effected and a Committee on Credentials appointed.

Following this will come the adoption of regulations for the government of the Congress and its proceedings, and the reception of official communications and invitations.

The Nominating Committee will then report the nominations for officers, after which the election of officers will follow.

(8) The proceedings of the Congress will be conducted in the English language; but, when participants in discussions speak in German, French, Spanish or Swedish, interpreters will translate these languages into English. Addresses, papers, or communications printed or published by the Congress will be published in English, German, French and Spanish.

The publication of the Proceedings will be intrusted to a special committee, to be appointed by the President of the Congress.

To defray the expenses attendant upon such publication, each member from the United States or member of the American Pharmaceutical Association who may take part in the Congress will be required to pay the sum of five dollars; no assessment to be made upon other members or visitors.

(9) To facilitate the conduct of the proceedings of the Congress, the Committee on Arrangements will classify the business according to the subjects, and the Congress will for that purpose be arranged into four sections, as follows:

Section I. Historical and Ethical Pharmacy.

Section II. Pharmaceutical Education and Legislation.

Section III. Pharmacopœial Matters.

Section IV. General Section, embracing pharmaceutical questions and subjects not assignable to any of the three preceding sections.

The order of business after the election of officers will be in conformity with this classification.

*Subjects Proposed for Papers, Reports and Discussion.*

## SECTION I.—HISTORICAL AND ETHICAL PHARMACY.

(1) The condition of pharmacy four centuries ago as contrasted with its present status.

(2) The history of pharmacy and pharmaceutical institutions in the United States.

(3) The ethics of the practice of pharmacy, and the mutual relations between physician and pharmacist, and between pharmacists and the public.

(4) The influence exerted upon the practice of pharmacy by the introduction of chemicals and other medicinal substances controlled or limited by patents, copyrights, trade-marks, or other legal restrictions, but which are commonly ordered by physicians in their prescriptions.

Should such limitations as foster monopoly in the manufacture and sale of such products be removed in the interest of the public good?

(5) The relations of pharmacists to public sanitation.

(6) Statistics of the present number of pharmacies in proportion to population in various countries, and of imports and exports of crude drugs, medicinal chemicals, and pharmaceutical preparations during the last half-century.

## SECTION II.—PHARMACEUTICAL EDUCATION AND LEGISLATION.

(1) Statistics giving the number of schools or colleges of pharmacy in each country, and the total number of students pursuing pharmaceutical courses.

(2) How do the education and the professional and social position of pharmacists compare with those of other professions?

(3) What legislation, if any, is at present most needed for the advancement of the best interests of pharmacy?

(4) To what extent is official supervision of drug-stores necessary or beneficial?

## SECTION III.—PHARMACOPŒIAL QUESTIONS.

(1) The proper scope of a national pharmacopœia.

(2) What improvements, if any, are desirable and practicable in pharmacopœial nomenclature? Is a nearer approach to international uniformity possible?

(3) What would be an ideal pharmacopœia?

(4) What progress has been made towards the preparation of an international pharmacopœia for potent remedies?

What action, if any, should be taken in reference to this subject?

(5) Have the influence and co-operation of pharmacists increased in the work of pharmacopœial revision in the various countries? What proportion of the membership of the pharmacopœial revision committee or commission of your country consists of pharmacists?

(6) Should any substance, the manufacture or sale of which is restricted by any patent, copyright, or trade-mark, be admitted into any national pharmacopœia? If so, under what conditions?

(7) What consideration should determine the introduction into the Pharmacopœia of a new remedy, or the retention or rejection of one already in it?



SECTION IV.—GENERAL SECTION.

(1) Upon what general plan can a systematic pharmaceutical nomenclature of the complex organic chemicals recently being introduced into the *Materia Medica* (such as antipyrine, etc.) be constructed?

(2) In what directions may the pharmacist profitably extend his technical and professional work to render him less dependent upon the purely mercantile part of his business?

Papers upon these and other subjects which may be presented and accepted will be referred to their appropriate Sections.

*The American Pharmaceutical Association* will hold its forty-first annual meeting in Memorial Art Palace, Chicago, commencing Monday, August 14 next, one week preceding the meeting of the Seventh International Pharmaceutical Congress. An elaborate circular has been prepared by the local Secretary, and several weeks ago mailed to all members and others interested. There can be no doubt that at the time when these meetings are to be held, visitors to the World's Columbian Exposition will be very numerous, and it may not be an easy matter to then secure suitable accommodations readily. In his circular the local secretary has directed special attention to this matter, and it will be well for those, intending to visit Chicago about that time, to bear in mind that accommodations should be secured in advance, and that the labors of the local secretary for securing such will be much facilitated by promptly applying to him, stating time, number of persons, accommodations desired, etc. The Bureau of Public Comfort, which is under the control of the directors of the Exposition, will co-operate with the local secretary in making satisfactory provision for visitors and participants to both the meetings referred to above. Obviously, those making early application are likely to be suited more promptly than those delaying until near the time of meeting. All communications relating to these matters should be addressed to Mr. Henry Biroth, Local Secretary, Am. Phar. Assoc. and Ill. Phar. Assoc., Rooms IIII-III3 Schiller Building, 103-109 Randolph Street, Chicago, Ill.

*Attention to Medical Men at the World's Fair.*—The Joint Committee of the Chicago Medical Profession on World's Fair Entertainment has delegated the establishment of a Bureau of Information and Service, with approval and endorsement to Chas. Truax, Greene & Co., the Committee reserving to itself the duty of such social entertainment of visiting physicians during the continuance of the Exposition, as may seem desirable. On application of the Practitioners' Club and the South Side Medical Club, the matter of social entertainment was delegated to them, with full authority to act in the capacity of entertaining bodies, with the retention of the Chairman and its American and Foreign secretaries already appointed, as follows:

*Chairman*, Dr. Chas. Warrington Earle; *American Secretaries*, Dr. Archibald Church, Dr. Geo. Henry Cleveland, Dr. John C. Cook, Dr. J. C. Culbertson; *British*, Dr. Sanger Brown; *German*, Dr. F. C. Hotz; *French*, Dr. Fernand Henrotin; *Spanish*, Dr. E. J. Gardiner; *Italian*, Dr. A. Lagario; *Swedish*, Dr. K. Sandberg; *Canadian*, Dr. R. D. McArthur.

*The Eleventh International Medical Congress* will meet in the city of Rome, Italy, September 24 to October 1 next, and transact its scientific labors in 19 sections, meeting simultaneously and each electing its own officers, while the

general sessions of this Congress, whose officers will be announced at the opening session, are reserved for the consideration of the Congress and of its common interests, and for addresses and communications of general interest and importance. Papers and communications intended for the Congress must be announced before June 30; and of each a brief abstract, containing the conclusions, must be sent to the Committee not later than July 31. These abstracts will be printed and distributed to the members by authority of the president. But the manuscripts of all addresses, papers and communications must be handed to the secretary before the close of the meeting; and a special committee on publication will decide which or what part of them shall be published in the Transactions of the Congress. Fifteen minutes are allowed for the reading of a paper, and in the discussions five minutes for each speaker, who can take the floor but once on the same subject; for closing the discussions the author of a paper is allowed ten minutes. Members who participated in the discussions are required to hand to the secretaries their remarks in writing. The official languages of the sessions are Italian, French, English and German, and the programs and daily bulletins will be published in these four languages; during the meetings, however, a member may be permitted to use, for a brief remark, any other language, provided some member present expresses a willingness to translate such remarks into one of the official languages.

During the continuance of the Congress an *International Exhibition of Medicine and Hygiene* will be inaugurated in Rome; it will be in charge of a special committee, of which Prof. L. Pagliani, Ministère de l' Interieur, Rome, is the president.

For the transatlantic voyage, both ways, the North German Lloyd and the Hamburg-American Packet Co. offer a reduction of 25 per cent., and the Compagnie générale transatlantique a similar reduction.

Chairman of the American National Committee for this Congress is Dr. A. Jacobi, 110 West 34th Str., New York.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*Urines chyleuses et hémato-chyleuses.*—Définition; caractères physiques; recherches et dosage des graisses, des albuminoides, du sang, etc.; analyse microscopique (recherche des parasites, etc.); diagnostic et pronostic urologiques; mécanisme pathogénique. Par A. J. Zune, rédacteur en chef du "Moniteur du praticien." Paris: chez l'auteur, 108 bis rue de Rennes. 1893. 8vo. Pp. 82. Prix, 4 francs.

Chylous and hemato-chylous urines: definition, physical characters; detection and estimation of fats, albuminoids, blood, etc.; microscopic analysis (detection of the parasites); urological diagnosis and prognosis; pathogenic mechanism.

The title-page explains in a measure the scope of the work. The definition of the diseases under consideration is given in the introduction. The author then discusses the remaining subjects in five chapters, beginning with the physical characteristics, subdivided into general considerations, color, consistence, opacity, odor, fluorescence, viscosity, volume, density, reaction. polarimetric deviation and suspended matters. As an illustration the changes

occurring in these physical characters during a period of about four months are given in tabular form. After noting the qualitative tests, the various processes recommended for the quantitative determination of the morbid constituents are described, and these are further characterized by determining and estimating for the fats the different fat acids, for the albuminoids the globulin, myosin, urocasein, mucin, serin, paralbumin, hemialbumin, hemialbuminose, peptones, etc. Other constituents, like cholesterin, lecithin, etc., have not been neglected. Chapter III is devoted to the microscopic examination of these urines, the different animalculæ, in some cases with their ova, observed in different countries, being described and illustrated upon four plates. The last two chapters discuss the diagnosis, prognosis and pathogenesis of chyluria. The importance of the work will readily be seen from the above brief analysis of its contents, particularly when it is considered, that the literature on the subject has been well utilized, and supplemented by many observations and researches made by the author.

*Chemical Papers from the Research Laboratory*, Pharmaceutical Society of Great Britain. Edited by Wyndham R. Dunstan, M.A., Professor of Chemistry to the Pharmaceutical Laboratory and Director of the Research Laboratory. Vol. I. London, 1892. 8vo. Pp. 232.

The volume contains reprints of papers which have been previously reported to the Pharmaceutical Society, Royal Society, Chemical Society and Physical Society, and which describe the results of the chief chemical investigations carried on in the research laboratory during the preceding three years. The experimental work in six of the papers had not been made at the same laboratory; but the inquiries described—medical, crystallographical, botanical, etc.—were suggested by the chemical investigations, and the two series of the papers had been published simultaneously. A number of these papers have been transferred, wholly or in abstract, to previous volumes of this journal.

*Proceedings of the ninth annual convention of the Association of Official Agricultural Chemists*, held at the National Museum, Washington, D. C., August 25-27, 1892. Edited by Harvey W. Wiley, Secretary of the Association. Published by authority of the Secretary of Agriculture. Washington: Government Printing Office. 1892. 8vo. Pp. xvii and 243.

This is Bulletin No. 35 of the Division of Chemistry, U. S. Department of Agriculture.

*Proceedings of the National Wholesale Druggists' Association* in convention at Montreal, Canada, Windsor Hotel, September 19-22, 1892. Minneapolis: L. Kimball Printing Company. 1892. 8vo. Pp. 319.

The frontispiece of the volume is the phototype portrait of J. E. Davis, of Detroit, president for the current year.

*Carl Wilhelm Scheele*, Pharmacist and Chemist. A brief account of his life and work. London, Pharmaceutical Society of Great Britain. 1893. Pp. 24. Reprint from the *Pharmaceutical Journal* of January 14.

*Annus Pharmaceuticus*. 1891. Pp. 48.

*Annus Pharmaceuticus*. 1892. Pp. 48.

The two pamphlets which are reprints from the *Pharmaceutical Journal* of January 2 and of December 31, 1892, give brief reviews of pharmaceutical matters and work done during the years stated in Great Britain and elsewhere.

*Caffeine and the Question of its Isomerism.* By Albert B. Prescott, M.D. Pp. 15.

Reprint from the Journal of the American Medical Association, Jan. 28, 1893.

*Indische Fragmente.* Strychnos Nux vomica. Von A. Tschirch.

*Ueber das Jodtrichlorid.* (Iodine trichloride.) Von E. Tavel und A. Tschirch.

*Ueber das spektroskopische Verhalten des Blutes* nach Aufnahme von schädlichen Gasen, und eine Methode diese Veränderungen für gerichtliche Zwecke objectiv zur Darstellung zu bringen. Von Gustav Bieder.

On the spectroscopic behavior of blood after the absorption of deleterious gases, and a method to exhibit these changes for forensic purposes.

*Proceedings of the American Pharmaceutical Association*, at the fortieth annual meeting, held at Profile House, N. H., July, 1892. Also the constitution, by-laws and roll of members. Philadelphia: Published by the American Pharmaceutical Association. 1892. 8vo. Pp. xxiv and 1212.

The present volume contains from 400 to 500 pages more than those which preceded it for a number of years. The pamphlet edition of the minutes and papers read have been in the hands of the members for some months. The Report on the Progress of Pharmacy covers 700 pages, is very comprehensive, and the abstracts are quite replete. The price for this volume, bound in cloth, was fixed at \$5.50 a copy, free of postage—the same as several of the preceding volumes—under the impression that it would not materially exceed them in size. This low price remains as announced, and the volume is also included in the sets, which are sold at large discounts from the prices of single volumes.

A slight change has been made in the date of the next annual meeting, which will begin in Chicago, on Monday, August 14 (instead of Tuesday, August 15, as previously announced), at 3 P.M. The local Secretary, Mr. Henry Biroth has already issued a circular, announcing the date, and giving other particulars. Those intending to be present at the meeting, or at that of the International Pharmaceutical Congress, which convenes on the Monday following, may obtain particulars in regard to the securing of rooms and other matters, by addressing the local Secretary, rooms 1111-1113 Schiller Building, 103-109 Randolph Street, Chicago, Ill.

*Studien ueber die Guttapercha.* Von Otto Oesterle.

The preceding four essays are reprints from Archiv der Pharmacie, and were communicated by Professor A. Tschirch.

*Die italienische Pharmakopöe.* Von Dr. Bruno Hirsch. Pp. 28.

A review of the new Italian pharmacopœia, reprinted from Phar. Centralhalle.

*Papoid Digestion.* By R. H. Chittenden, Professor of Physiological Chemistry in Yale University. Pp. 36.

Reprint from Transactions of the Connecticut Academy, vol. ix.

*Piperazin in the treatment of Stone in the Kidney.* Report of cases. By David D. Stewart, M.D., Lecturer on Clinical Medicine in the Jefferson Medical College. Pp. 9.

Reprint from Therapeutic Gazette, January 16, 1893.



*An Outline of the Technique of Abdominal and Pelvic Operations*, as performed in the Medico-Chirurgical Hospital, of Philadelphia. By Professor Wm. Easterly Ashton, M.D.

Reprint from the Medical Bulletin, January, 1893, with illustrations.

*An historic Pharmacy*. By Joseph Hatton.

Reprint from the English Illustrated Magazine, December, 1892, in the Chemist and Druggist, January 23, 1893, with illustrations. The pamphlet refers to the establishment of Allen & Hanburys.

*The Bicycle in its Relation to the Physician*. By Seneca Egbert, A.M., M.D., Lecturer on Hygiene, Drexel Institute, Philadelphia. Pp. 11.

Reprint from the University Medical Magazine, November, 1892.

*The Calendar of the Pharmaceutical Society of Great Britain*. London, 1893. Pp. 555. Price, two shillings.

The Society was founded in 1841, incorporated by Royal Charter 1843, and confirmed and enlarged by acts of Parliament 1852, 1868 and 1869. The publication contains the charter pharmacy act and amendments, by laws, lists of officers, members, honorary and corresponding members, associates and students, regulations of the benevolent fund, donations to the same, extracts from various laws, applying more or less directly to pharmacy, and various other matters of interest.

*Modern Homœopathy*, its absurdities and inconsistencies. By Wm. W. Browning, A.B., LL.B., M.D., Lecturer upon and Demonstrator of Anatomy. Long Island College Hospital, etc. Pp. 37.

This essay was awarded the prize of \$100, offered by Dr. Geo. M. Gould, of Philadelphia, and is designed for distribution by physicians in order to disseminate more enlightened views upon the subject of which it treats. The author illustrates the "absurdities" in a clear and convincing manner, and quotes largely from homœopathic writers to prove the inconsistencies of the system and its lack of scientific foundation.

*History of the Life of D. Hayes Agnew, M.D., LL.D.* By J. Howe Adams, M.D. Pp. 376. With fourteen full-page portraits and other illustrations. Price, extra cloth, bevelled edges, \$2.50; half morocco, gilt top, \$3.50. The F. A. Davis Co., publishers. Philadelphia, 1892. Large 8vo. (Sold only by subscription.)

A handsome volume and a biography full of interest, and written with evident love and veneration. Dr. Agnew himself had left among his papers but little material available for the history of his life; through the efforts of Mrs. Agnew and of his numerous friends, dates and facts and documents were supplied. Born in 1818, he entered the medical department of the University of Pennsylvania in 1836, graduated in 1838, and then went to Nobleville, now Christiana, Pa., to assist his father in his medical practice. After some years he moved to Philadelphia, where in 1852 he took charge of the School of Anatomy on Chart Street, was called to the chair of surgery of the University of Pennsylvania in 1871, resigned in 1889, and died March 22, 1892. Between these dates there lies a life of honest toil and of marked achievement, which is well depicted in the book before us. "One point in Dr. Agnew's character," says his biographer, "which strikes most forcibly, is the fact that he had but

few qualities considered in this day to be necessary to success. Young men are admonished that the way to be successful is to be grasping, selfish and pushing, and insensibly they grow up with the idea of each man for himself; but here was a man who achieved success in life by a diametrically opposite course. He was modest, retiring, kind, gentle and devoid of all ambition. Truth was the object of his search; he endeavored to ascertain the facts and draw the right inferences; justice was the bed-rock of his character."

## OBITUARY.

*Alphonse Louis Pierre Pyrame De Candolle*, professor of botany and director of the botanic garden at Geneva, Switzerland, died in that city April 5 last, in the eighty-seventh year of his age. He was the son of the celebrated botanist, Augustin Pyrame De Candolle, and was born in Paris, France, October 28, 1806. The father having, in 1816, accepted a call as professor of botany to Geneva, Alphonse completed his education at the university named, studying jurisprudence, and also botany, the latter science with such success that already in 1830 he published a monograph on the campanulaceæ, and in 1832 on the anonaceæ, which works were followed in 1835 by his "Introduction à l'étude de la botanique." In 1834 he succeeded his father in the professorship, and after the latter's death in 1841 continued, with the aid of other botanists, the publication of the large work "Prodromus systematis naturalis regni vegetabilis" (complete in 21 volumes). Among his other famous works may be mentioned "Géographie botanique raisonnée" (1855), "Histoire des sciences et des savants depuis deux siècles" (1873), "Origine des plantes cultivées" (1883), and "Monographiæ phanerogamarum prodromi nunc continuatio nunc reviso" (1878 to 1881); the last-named work was issued with the collaboration of his son Casimir Pyrame.

*Constanz S. Manz*, died April 19, 1892, in Lyons, Ia., where he was born March 1, 1860. His father being a pharmacist, he learned the business under him, and some time after graduating from the Philadelphia College of Pharmacy in 1881, succeeded his father in business. He left a widow and two sons.

*William Arthur Haas*, of South Easton, Pa., a promising senior student at the Philadelphia College of Pharmacy, died at his home in March. The Zeta Phi Society adopted, March 25, the following resolutions:

WHEREAS, It has pleased Almighty God in his infinite wisdom to remove from our midst our fellow class-mate William Haas;

*Resolved*, That we do most sincerely miss him and mourn his loss, and that we feel that pharmacy has lost one of its most promising students.

*Resolved*, That a record of his death be put on the minutes of the society, and that a letter of condolence be sent to his bereaved parents.

*Resolved*, That these resolutions be published in the American Journal of Pharmacy, the daily papers and in the Alumni Report.

HOWARD F. PYFER,  
ROBERT W. SMINK,  
HARRY R. PARVIN,

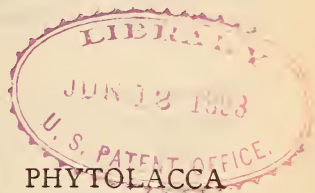
*Committee.*

# THE AMERICAN JOURNAL OF PHARMACY.

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JUNE, 1893.

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## A PROXIMATE PRINCIPLE FROM PHYTOLACCA DECANDRA.

BY HENRY TRIMBLE.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 123.

Read at the Pharmaceutical Meeting, Philadelphia College of Pharmacy, May 16.

Some weeks ago Mr. E. G. Eberhardt, chemist for Eli Lilly & Co., of Indianapolis, sent for further investigation a sample of material obtained from poke root. It was prepared according to the following method: The concentrated alcoholic percolate was precipitated by water, and the separated precipitate purified by solution in alcohol and precipitation by chloroform; this precipitate was dissolved in potassium hydrate solution and precipitated by diluted sulphuric acid, then dissolved in alcohol and precipitated by ether. The dried and finished product was obtained as an amorphous, grayish powder, glistening somewhat from its scaly condition. When shaken with water it frothed considerably. Its taste was slightly bitter and acrid, and when inhaled it acted as a sternutatory. It was slightly soluble in cold and boiling water, soluble in alcohol; insoluble in ether and chloroform. Acetic acid dissolved it with the aid of heat, and formed a jelly on cooling. Alkalies formed with it soluble, amorphous compounds that scaled on drying. Sulphuric acid, when concentrated, dissolved it with a cherry-red color, changing to violet and purple. On the application of heat, the substance commenced to decompose at about  $208^{\circ}$  without fusing, and at a higher temperature was consumed without leaving an appreciable residue.

Nearly as much loss in moisture occurred when the substance was dried in a vacuum over sulphuric acid at ordinary temperatures, as when it was heated in an air bath at  $110^{\circ}$ . No further loss was noted on raising the temperature from  $110^{\circ}$  to  $120^{\circ}$ .

The substance, when dried at these temperatures, gave the following results on combustion :

- (I) 0.2563 gram of substance gave 0.5543 gram  $\text{CO}_2$  and 0.1750 gram  $\text{H}_2\text{O}$ .  
 (II) 0.203 gram of substance gave 0.442 gram  $\text{CO}_2$  and 0.1429 gram  $\text{H}_2\text{O}$ .

	(I) Per Cent.	(II) Per Cent.
Carbon, . . . . .	58.98	59.36
Hydrogen, . . . . .	7.58	7.81
Oxygen, . . . . .	33.44	32.83
	<hr/> 100.00	<hr/> 100.00

This corresponds to the formula  $\text{C}_{54}\text{H}_{82}\text{O}_{23}$ .

In the letter accompanying the sample, Mr. Eberhardt expressed the opinion that this substance resembled the phytolaccic acid of Terreil, mentioned in the *AMERICAN JOURNAL OF PHARMACY*, 1881, p. 325. There are, however, some important differences in solubility. It would probably be much nearer the truth to classify this compound with the saponins, since it resembles the latter in many of its properties.

In 1888 (*AMERICAN JOURNAL OF PHARMACY*, p. 123) Mr. W. A. Partee separated from poke root an amorphous substance which gave a reddish color with sulphuric acid, and which he considered to be saponin.

It may be said that the above analysis does not indicate saponin, but in answer to such an objection we may recall the fact that the difference from the published analyses is not great, that there are probably many saponins, and that it is doubtful if any one of the saponins has ever been prepared perfectly pure.

## EPIPHEGUS VIRGINIANA.

BY ALBERT C. KOEPPEN, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 124.

This indigenous plant, commonly called "beech drop," is parasitic on the roots of the beech tree. Its medical properties are regarded as astringent and depurative.



A quantity of the drug was collected in August, in the vicinity of Philadelphia, and a portion was submitted to chemical examination, as follows:

A weighed quantity dried at  $110^{\circ}$  was found to contain 7.08 per cent. of moisture. This on ignition yielded 16.91 per cent. of ash. Preliminary tests for starch and tannin were made in a decoction of the drug, a blue color with iodine was obtained, indicating starch, and a dark green color with ferric chloride and a precipitate with gelatin indicating tannin.

Fifty grams of the drug in fine powder, yielded to petroleum ether 0.48 per cent. of a solid orange-yellow substance, which by recrystallization from hot absolute alcohol several times, was obtained in nearly white crystals. A larger quantity was prepared from another portion of the drug, and it was found to be a crystalline fat, melting at a low temperature and saponifying with solution of potassium hydrate.

After treatment with petroleum ether, the remaining drug was extracted with stronger ether, which solvent extracted 0.31 per cent. of a resinous substance. Gallic acid was not detected in this portion, and it was found to consist chiefly of resin.

Absolute alcohol was next applied to the residual drug, and extracted 9.32 per cent. This extract was soluble in water, and when so dissolved and acidified, petroleum ether extracted a crystalline body which did not reduce Fehling's solution, but did redden litmus paper, and otherwise gave evidence of being an organic acid. From this same acidified solution, after removal of the organic acid, ether and chloroform extracted a body which gave all the reactions of a glucoside. After removal of these substances, the solution was made alkaline, and agitated with petroleum ether, ether and chloroform, the last, only, extracted a body, which, when purified, gave many of the alkaloidal reactions. An attempt to obtain larger quantities of these substances from the commercial drug failed, owing to the fact that the drug, as obtained in the market, had deteriorated; and instead of absolute alcohol extracting a substance soluble in water, this extract was found to be resinous, and did not indicate any glucoside or alkaloid, and but small quantities of organic acid. It was afterwards found that this commercial drug was more than a year old.

The analysis was continued on the fifty grams of fresh drug, and the following is a summary of the results obtained :

	Per Cent.
Fat, . . . . .	0'48
Resin, . . . . .	0'31
Alcohol extract, containing tannin, crystalline organic acid, alkaloid and glucoside, . . . . .	9'32
Mucilage and sugars, . . . . .	1'90
Sodium hydrate extract, . . . . .	0'25
Hydrochloric acid extract, . . . . .	0'14
Lignin, . . . . .	0'28
Ash, . . . . .	16'91
Moisture, . . . . .	7'08
Cellulose and undetermined, . . . . .	63'33
	<hr/> 100'00

## A COMPARISON OF SOME MEDICINAL BRANDS OF HYDROGEN PEROXIDE.

By R. LOUIS LLOYD, A.B.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, May 16.

The brands examined were Béné, Peuchot, Marchand and Oakland Chemical Company. Each was claimed to be chemically pure and of fifteen volumes strength. All were obtained directly from the manufacturers, and, though some were several weeks old, they were in unbroken packages and remained sealed until the moment of the estimation of oxygen. Mr. Peuchot learned that the analysis was being made and sent a special sample which he claimed would be an improvement on his former productions. This, in the table, is designated as Peuchot No. 2.

The *volume of oxygen* was estimated by the method of F. X. Moerk. A solution of potassium permanganate, 2.625 grams to the litre of water was prepared. About two litres of water was acidified with 5 cubic centimetres of dilute sulphuric acid, and exactly 5 cubic centimetres of the hydrogen peroxide solution added. The potassium permanganate solution was then poured in gradually until it ceased to be decolorized, and the number of cubic centimetres added, divided by 10, represents the volume of oxygen.

In the results for volume, that sample which was examined again after being opened, is marked with the small letter (*a*).

The *acidity* was reckoned by using a solution of ten milligrams of potassium hydrate in one cubic centimetre of water, with phenol-

phthalein as indicator. Ten cubic centimetres of the sample was tested in each case, the figures in the table representing the average of results.

Fifty cubic centimetres were evaporated at a low heat to dryness and both residue and the original sample tested for chloride, sulphate, phosphate, fluoride, borate, barium and other metals by the usual processes of the laboratory. Sodium and potassium were recognized by the Bunsen flame.

Each sample underwent the same treatment, and attention may be called to the fact that, however widely these results differ from results of other investigators, they are, as they claim to be, *comparisons*. The same weights, measures and solutions were used in every instance, in order to guarantee uniformity.

Generally more than one bottle of a brand was examined and the volume of oxygen was found to vary considerably, no doubt dependent largely on age. Of the Peuchot brand, it is claimed, however, it "can be left open and exposed to the air without losing strength."

	Specific Gravity.	Volume of Oxygen.	Volume of Oxygen after having been opened at least 24 hours.	Acidity. Milligrams of KOH for 10 cc.	Residue in 50 cc. Milligrams.	Sulphuric acid or Sulphate.	Metals.	Other matter.
O. C., . . . . .	1'0119	113'5—12'0	113'0	6'45	30'0	trace	Sodium	present
Marchand, . .	1'0116	13'5—110'4	10'3—110'0	25'16	50'6	present	Sodium	boric acid
Béné, . . . . .	1'0110	10'5—109'8	109'45	6'83	60'0	present	Sodium Potassium	none
Peuchot No. 2,	1'0120	11'76	—	7'20	150'0	trace	Calcium Sodium Potassium (trace)	glycerine
Peuchot No. 1,	1'0136	12'5—116'1	114'05	9'85	320'0	present	Sodium	present

All the samples contained HCl or chloride, and phosphoric acid or phosphate (Béné merely a trace); but were free from barium, except P. No. 1, which contained a trace.

In the residue from Marchand's solution no chloride could be found; the solution, however, evidently contained hydrochloric acid, which must have been driven off during evaporation, the excess of sulphuric acid preventing the formation of chlorides.

The residues from Peuchot's and O. C.'s solutions were not again entirely soluble in water, alcohol, ammonia or cold hydrochloric acid. In Peuchot No. 2 this insoluble matter was calcium phosphate.

## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*The active principles of bryonia root.*—M. Masson gives, in *Four. de Pharm. et de Chim.*, March, 1893, p. 300, the following processes for the extraction and the purification of the active principles of bryonia root :

The fresh root is cleaned, cut and dried, then coarsely pulverized, and exhausted in the cold with water containing 3 per cent. of hydrochloric acid. The aqueous acid liquid is treated with tannin until no further precipitate forms. The precipitate, which is in the form of compact mass, is treated with water containing HCl, then with distilled water, dried, pulverized and dissolved in 90 per cent. alcohol; the solution is filtered, decomposed by oxide of zinc, and the resulting mass exhausted with cold distilled water; this upon evaporation yields impure *bryonin*, which is purified by dissolving it in cold distilled water, containing five per cent. HCl; and dialyzing until the liquid in the inner vessel yields a residue free from ash, but completely soluble in absolute alcohol. This alcoholic solution is mixed with anhydrous ether; the precipitate washed with ether and dried at 100°. Pure bryonin is white, amorphous, very bitter, soluble in water and alcohol, and insoluble in anhydrous ether and in chloroform. It is dextrogyre, precipitates tannin and ammoniacal plumbic acetate, and has the composition  $C_{34}H_{48}O_9$ ; its alkali compounds are completely insoluble in alcohol.

The root exhausted with water as above, dried, and treated with 90 per cent. alcohol yields an impure resin which the author calls *bryoresin*. It is purified by triturating with acidulated water, agitating with several portions of boiling water, drying, dissolving in anhydrous ether and evaporating. The resin is soft at 15°, red, amorphous, soluble in alcohol, ether, chloroform, glacial acetic acid, and in alkalies, and from the latter solution is reprecipitated by acids.

Bryonin boiled with dilute sulphuric acid yields a *glucose*, which the author did not succeed in crystallizing, and a yellowish amor-



phous resin (called *bryogenin*), soluble in alcohol, insoluble in ether.

*Inulin*, since its discovery by V. Rose, in 1804, has always been prepared by precipitating it either in the cold or by means of alcohol, from its more or less clear aqueous solution. It is then subjected to reprecipitation until the product obtained is white. But this product, according to C. Tanret (*Four. de Pharm. et de Chim.*, April, 1893, p. 354) is far from being pure; it has a rotatory power which varies from  $\alpha_D = -31^\circ$  to  $\alpha_D = -35^\circ$ . The author has succeeded in separating two closely resembling, but nevertheless distinct principles, which he named respectively *pseudo-inulin* and *inulenin*.

The different solubilities of these bodies in presence of baryta water in excess, affords a means of separating them from inulin and also from one another.

For preparing inulin from Jerusalem artichoke, the tubers are scraped, the pulp expressed, and the juice cleared by means of solution of subacetate of lead; excess of lead is eliminated by adding sulphuric acid, and inulin is precipitated by addition of concentrated baryta water. A second precipitate can be obtained by adding alcohol of 80 per cent.; this is principally pseudo-inulin and inulenin. The precipitates are washed in cold baryta water, dissolved in hot water and reprecipitated. By repeating this treatment until the mother-liquor is no longer darkened by it, inulate of baryta is obtained. This is dissolved in hot water, and decomposed by means of  $\text{CO}_2$ , the solution is boiled, filtered, and deposits, upon addition of  $\frac{1}{4}$  of its volume of 95 per cent. alcohol, pure inulin. It is thrown on a filter, washed with 60 per cent. alcohol and dried over sulphuric acid. Pseudo-inulin is deposited from its aqueous solutions in irregular granules and from its alcoholic solutions in globules; it is very soluble in water and weak alcohol, while hot, but only slightly soluble in cold water, and insoluble in cold alcohol. It has a rotatory power of  $\alpha_D = -32.2^\circ$ , which under the influence of acids, is increased to  $-85.6^\circ$ . Analysis indicates the formula  $16 (\text{C}_6\text{H}_{10}\text{O}_5)\text{H}_2\text{O}$ .

To inulenin the author assigns the formula  $10 (\text{C}_6\text{H}_{10}\text{O}_5) 2 \text{H}_2\text{O}$ . It may be procured in fine microscopic needles; dried at  $100^\circ \text{C}$ ., it is soluble in several parts of cold water, in 35 parts of cold 30 per cent. alcohol, and in 245 parts of 50 per cent. alcohol.

*Phosphoric acid in wines* has been estimated by Morgenstern and Paolinoff (*Four. Pharm. et Chim.*, May, 1893, p. 482) by the molybdate and the citrate methods, and they find that the latter gives the best results. They apply their simplified method directly to the wine, without first submitting it to evaporation, and without calcining the dry residue, thereby avoiding considerable loss of time. 200 cc. of wine are placed in a conical glass, boiled for some time to remove alcohol, 20 cc. of nitric acid, sp. gr. 1.38, added, and the boiling continued to eliminate the greater part of the nitrogen oxides. After cooling, ammonia is added to neutral reaction, and to the cooled liquid 50 cc. ammonium citrate are added. Then add drop by drop, and stirring constantly, 50 cc. magnesium mixture, when ammonio-magnesium phosphate will at once deposit. The pyro salt obtained after calcination is entirely white.

*Tar water.*—Ernest Gille states that the *concentrated tar solution* of the Belgian pharmacopœia (Norwegian tar, 250; sodium bicarbonate, 15; water, 1,000; heat in a water-bath for 3 hours and condense volatile products) has the specific gravity of 1.0127, leaves, upon the evaporation and drying of the residue, 3.7052 per cent. of extract, and yields 0.8932 per cent. ash. The tar water (made from conc. tar solution 30, and distilled water 970) differs but little from pure water in density, has but a slight tint, keeps unaltered for a long time and yields 0.0918 per cent. of extract and 0.0253 per cent. of ash. The tar water of the German pharmacopœia is considerably darker, becomes rapidly cloudy, has the specific weight 1.0027, and yields 0.4966 per cent. extract and 0.0308 per cent. ash. Jeannel's formula, triturating intimately 10 gm. tar with 10 gm. sodium carbonate and diluting to obtain 1 kgm., gives a tar water whose specific weight is 1.0042, and which yields 1.2085 per cent. extract and 0.3640 per cent. ash.

Tar water prepared according to the Belgian pharmacopœia, if subjected to distillation in a current of steam, yields a liquid which slightly reddens litmus, turns brown by action of alkalies, shows strong reducing power, is colored violet by ferric chloride, and yields iodoform with iodine and potassium. It gives the reactions of furfurol with aniline and hydrochloric acid. The concentrated liquor of the Belgian Pharmacopœia shows the same characters under the same condition, but, of course, in greater degree. That of the German pharmacopœia, upon distillation, yields a liquid

which precipitates abundantly upon addition of an excess of bromine water.—*Four. de Pharm. d'Anvers*, March, 1893, p. 81.

*The methylamines* have been examined chemically and physiologically by Dr. Combemale (*Bull. gén. de thérap.*, March, 1893, p. 241). *Monomethylamine* is a compound in which one hydrogen atom of the ammoniacal radical is replaced by one methyl radical, its formula being  $(\text{CH}_3)\text{NH}_2$ . It is a gas, which several degrees below zero is converted into a very mobile liquid; it has an ammoniacal odor, is strongly alkaline, ignites, when it comes in contact with a flame, and burns with a yellowish color, giving water, carbonic acid and nitrogen. It is the most soluble of all known gases, one volume of water dissolving 1,150 volumes at  $12^\circ$ . After citing a large number of physiological experiments in detail, the author arrives at the conclusion that when injected under the skin, monomethylamine produces local irritation, even to necrosis, while its action on the entire organism causes hæmorrhage of the liver, lungs, heart and intestines. This general action is manifested by change in temperature, continuous flow of saliva and albuminuria. The local effects are produced by a solution of 1 in 250. For the general effects the dose must not exceed 10 cgm. per kgm. of body weight; above 15 cgm. death is certain.

*Dimethylamine*,  $(\text{CH}_3)_2\text{NH}$ , has much the same properties as monomethylamine. It is obtained pure and without difficulty by boiling nitrosodimethylamine with sodium oxide. Ingested into the stomach and employed in various doses, dimethylamine showed no appreciable action. Injected hypodermically it acts as an energetic caustic, producing an eschar with a solution of 1 in 200. Twenty cgm. per kgm of body weight is the minimum toxic dose. The change of temperature produced is not constant, nor is it proportionate to the dose or the strength of the solution employed. It produces increased salivation and also increases the alkalinity of the saliva. It is eliminated in part by the kidneys.

*Glycerite of oil of cade*.—Ch. E. Quinquaud (*L' Union phar.*, 1893, p. 190) commences the treatment of psoriasis by applying the following plaster to the diseased surfaces: Lead plaster, 600 gm.; yellow wax, 300 gm.; poppy seed oil, 600 gm. The scales should be removed, and a lukewarm alkaline bath given for half an hour, using not more than 100 gm. of carbonate of sodium for the bath. Upon leaving the bath the diseased parts should be anointed with



the following glycerite: Oil of cade, 140 gm., emulsionized with 15 gm. fluid extract of quillaia; and glycerite of starch, 845 gm. If this is well tolerated by the skin, it can be strengthened according to the following formula: Oil of cade, 460 gm.; fluid extract of quillaia, 40 gm.; glycerite of starch, 500 gm. If untoward symptoms arise, accidents can be averted by administering 2 to 6 gm. of salol during 24 hours.

*Calcium bisulphite* is, according to the clinical observations of Nils Sjöberg (*Eina*, through *Rev. intern. de bibliog. méd.*, April, 1893, p. 137), such a reliable antiseptic, that the irritation caused by it is an insignificant objection. However, it cannot be used in surgical operations, because it attacks the instruments used, but it can always find appropriate application as an antiseptic in virulent wounds, ulcers, etc. (See also *Amer. Journ. of Pharm.*, 1892, p. 467.)

*Syrup of narceine*.—M. Patrouillard proposes the following formula for an efficacious preparation: Narceine, 0.25 gm.; sodium benzoate, 0.40 gm., and simple syrup, 300 gm. The two powders should be triturated in a mortar, so that the solution may be perfect.—*Jour. de Pharm. et de Chim.*, April, 1893, p. 397.

## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*Potassium ferrocyanide*, generally considered to be a fairly stable compound, has been found in a recent investigation to be decomposable, not only by the weakest acids, but also by numerous non-acid organic substances, hydrocyanic acid being liberated. The dilute mineral acids containing even less than 0.1 per cent. formic, acetic, butyric, lactic, tartaric, benzoic, etc., acids, even carbonic acid and hydrogen sulphide, phenols, peptones, casein, etc., will decompose potassium ferrocyanide more or less quickly at temperatures below 100° C., liberating a portion of the hydrocyanic acid and forming white insoluble potassium ferrous ferrocyanide  $K_2Fe(Fe(CN)_6)$ ; with carbonic acid the reaction is  $2K_4Fe(CN)_6 + 3CO_2 + 3H_2O = 6HCN + K_2Fe(Fe(CN)_6) + 3K_2CO_3$ . In the manufacture of hydrocyanic acid from the ferrocyanide and sulphuric acid the residue consists of the above salt, from which the sulphuric acid extracts a part of the iron as ferrous sulphate which by oxidation changes to



ferric salt, and this then reacts with the ferrocyanide, forming Prussian blue, thus explaining the blue color of the residue. The acids in the gastric juice (hydrochloric and lactic) decomposing potassium ferrocyanide, direct experiments were made with artificial gastric juice at a temperature of 37–40° C., with the result that after a short time, evidence was obtained showing the formation of hydrocyanic acid. Casein and peptone, in the absence of free acids, under the same conditions, liberated but traces of hydrocyanic acid. The non-poisonous action of potassium ferrocyanide is explained by the decomposition being very slow, but if the administration be followed by that of an acid (a case is cited in which tartaric acid was taken afterward), death is rapidly caused. The decomposition of potassium ferrocyanide by dilute acetic acid has some importance in the examination of urine for albumen by the ferrocyanide test, a turbidity, occurring only after some standing, may not be due to the presence of albumen, but to the formation of insoluble potassium ferrous ferrocyanide. *The detection of hydrocyanic acid or simple cyanides*, excepting mercuric cyanide, in presence of potassium ferrocyanide is alone possible by Jaquemin's method, in which the material is distilled after the addition of a considerable quantity of sodium bicarbonate. This salt will not unite with free hydrocyanic acid, nor will it decompose potassium ferrocyanide. The distillate from 0.01 gram potassium cyanide, 10 grams ferrocyanide and 200 cc. water, will give a pronounced test for hydrocyanic acid.

*Mercuric cyanide* will not yield HCN by Jaquemin's test, but if to the mixture a few cc. of hydrogen sulphide water be added the distillate will contain HCN; this test is serviceable for the detection of mercuric cyanide even in presence of large quantities of ferrocyanide. While hydrogen sulphide easily decomposes the ferrocyanide in the absence of sodium bicarbonate, the addition of *one per cent.* of sodium bicarbonate completely prevents the decomposition.—Dr. W. Autenrieth, Arch. der Pharm., 1893, 99–109.

*Solanaceous bases.*—*Apoatropine* by treatment with hydrochloric acid according to the directions of Hesse (Am. Jour. Pharm., 1892, 644) for converting *atropamine* into *belladonnine* was found to form compounds which undoubtedly prove the identity of apoatropine and atropamine. The investigation also established that atropine by loss of one molecule of water is converted into apoatropine, and this in turn by dilute hydrochyloric acid yields belladonnine, which

by boiling with alcoholic baryta solution, is converted into tropine and atropic acid.

*Pseudohyoscyamine*, a new alkaloid from *Duboisia myoporoides*, was separated from chloroform solution by addition of ether after first removing hyoscyamine and hyoscyne as perfectly as possible by crystallization; the new alkaloid is lævogyre and forms small yellowish needles melting at  $133-134^{\circ}$  C., difficultly soluble in water and ether, easily soluble in alcohol and chloroform; it has the formula  $C_{17}H_{23}NO_3$ ; the aurochloride melts at  $176^{\circ}$  C., the picrate at  $220^{\circ}$  C., while the platinochloride sinters at  $116^{\circ}$  and decomposes at  $150^{\circ}$ . By boiling with baryta a base isomeric but not identical with tropine and pseudotropine was obtained (the reddish yellow platinochloride which it forms at  $210^{\circ}$  C. becomes deeper in color and at higher temperature blackens without melting) along with tropic acid.—E. Merck, Arch. der Pharm., 1893, 110-123.

*Champacol* is the crystallizable camphor separating from the volatile oil of the fragrant champaca wood (*Michelia Champaca*, L.) cultivated in tropical India. In the pure state it forms long, felted, odorless needles, melting at  $86-88^{\circ}$  C.; soluble in alcohol and ether; it has the formula  $C_{17}H_{30}O$ . If insufficiently purified the crystals liquefy and the pleasant odor of the wood becomes prominent.—Ibid., 123.

*Hydrargyrum thymolo-aceticum*, when first placed upon the market had no definite chemical formula assigned to it; recent investigation shows it to be formed from two molecules mercuric acetate in which one acetyl group is replaced by the radical thymyl so that it has the following formula  $Hg(C_2H_3O)_2 + Hg(C_2H_3O_2)(C_{10}H_{13}O)$ .—Ibid., 123.

*Adonite*, a crystallizable constituent of *Adonis vernalis* present to extent of four per cent., has the formula  $C_5H_{12}O_5$ , and is apparently a new pentatomic alcohol. It is insoluble in ether and petroleum ether, has a neutral reaction, is very soluble in water, crystallizes in large transparent prisms, and has at first a sweet taste rapidly giving place to a rather benumbing sensation. It crystallizes from alcohol in small needles, melts at  $102^{\circ}$  C.; does not reduce Fehling's solution, nor become brown with alkalies, but yields with sulphuric acid a perfectly colorless solution, and heated upon platinum foil, gives off the odor of caramel.—Ibid., p. 129.

*Corydalis cava alkaloids*, extracted from the root with alcohol, were capable of separation into two groups, the stronger and weaker bases. Of the latter group the greater portion was found to consist of *corydaline*, well crystallizable in large prisms melting at  $135^{\circ}$  C. A small quantity of a difficultly soluble base was obtained crystallizable in interlaced needles, melting with decomposition at  $218^{\circ}$  C.; it is probably not identical with *corycavine* of Freund and Josephy. Of the stronger bases *bulbo-capnine* was easily purified by taking advantage of the difficult solubility of the hydrochlorate; the alkaloid melts at  $199^{\circ}$  and is distinguished from all the accompanying alkaloids by its solubility in an excess of potassium hydrate solution; *bulbo-capnine* is the main alkaloid,  $2\frac{1}{2}$  parts being present for 1 part *corydaline*. Second to *bulbo-capnine* in quantity is an amorphous alkaloid (also yielding an uncrystallizable hydrochlorate), *corydine*, found in the mother-liquor from the first *bulbo-capnine* crystallization.—Ibid., p. 131-133.

*Hydrastine bitartrate*,  $C_{21}H_{21}NO_6 \cdot C_4H_4O_6 + 4H_2O$ , recently prepared by E. Merck, crystallizes in white needles, is easily soluble in hot water, but difficultly soluble in cold water; it is of especial importance in the purification of the alkaloid, *hydrastine*.—Arch. der. Pharm., 1893, 134.

*Carpaine*, the alkaloid discovered by Dr. Greshoff in the leaves of *Carica Papaya*, L. (Am. Journ. Pharm., 1891, 230) is present in the young leaves to the extent of 0.25 per cent., while in old leaves only 0.07 per cent. is present. J. J. L. van Ryn, in operating with 80 kilos, obtained 60 grams of the alkaloid, which was obtained perfectly colorless by recrystallizing first from ether, later from alcohol. The properties, as described in the Am. Jour. Pharm., 1891, 230, were confirmed, but one correction being necessary; the crystals melt at  $121^{\circ}$  C. (corr.) instead of  $115^{\circ}$ ; the alkaloid turns red litmus blue, but is indifferent to phenolphthalein; the strongest reagents were apparently without action upon the alkaloid. Sulphuric acid and bichromate of potassium gave a green coloration, but the acidified alkaloidal solution with a drop of potassium permanganate solution retained the red color for several hours. *Carpaine* has the composition,  $C_{14}H_{25}NO_2$ ; the platinochloride,  $(C_{14}H_{25}NO_2HCl)_2PtCl_4$ ; the aurochloride,  $(C_{14}H_{25}NO_2HCl \cdot AuCl_3)_2 + 5 H_2O$ ; the halogen salts decrease in solubility in the order in which they are given:



$C_{14}H_{25}NO_2HCl$ ,  $C_{14}H_{25}NO_2HBr$  and  $C_{14}H_{25}NO_2HI$ ; the sulphate,  $C_{14}H_{25}NO_2H_2SO_4 + 3H_2O$ , owing to its solubility in water was not crystallizable, but by the addition of ether to an alcoholic solution large colorless prismatic crystals separated after a time. The nitrate,  $C_{14}H_{25}NO_2HNO_3 + H_2O$ , is only soluble to the extent of 2 per cent. in water, but if to a 1 per cent. solution of the hydrochlorate a few drops nitric acid be added, a separation of the nitrate occurs, showing the decreased solubility of this salt in hydrochloric acid. The observations made by Dr. v. Oefele established that, with the exception of the caffeine group, carpaine was the only digitalis substitute which by subcutaneous injection did not cause local irritation or abscesses, while internal doses of 0.025 gram per day did not show any advantage over digitalis. The hypodermic use of 0.006–0.010 gram daily or on alternating days is recommended; the effect of the hypodermic injection is noticeable in the course of a few minutes.—*Arch. der Pharm.*, 1893, 184–211.

*Formalin* is a 40 per cent. aqueous solution of formaldehyde; it is a disinfectant, can be used either in solution as a spray or as a vapor and resembles mercuric chloride in being a destroyer of bacteria and differs from it in being non-poisonous. For the permanent sterilization of bandages *formalith* is recommended; this constitutes a cartridge made of infusorial earth, which has the power of absorbing an equal weight of formalin; it is claimed that by placing formalith in bottles or boxes containing the bandaging material, this is perfectly and permanently sterilized. An interesting property of formalin is worthy of note. If placed upon animal skin it changes the latter into leather, making it non-porous and hard.—*Dr. J. Stahl, Pharm. Ztg.*, 1893, 173.

*Formanilide*,  $C_6H_5NHCHO$ , at a recent meeting of the Royal Medical Society, in Budapest, was praised by six physicians as an analgetic, anæsthetic, antipyretic, antineuralgic and as a hæmodynamic combining therefore the properties of acetanilide, antipyrine and cocaine; the anæsthetic action of a 20 per cent. solution lasted 1–1½ hours, but was inferior to that obtained with cocaine, which, however, only lasted twenty minutes. Formanilide crystallizes in long, four-sided, flattened prisms, melting at 46° C., soluble in water and especially in alcohol.—(*Wiener Med. Presse*), *Pharm. Ztg.*, 1893, 160.



*Salokoll*, the trade name for phenocoll salicylate, has some therapeutic advantages over the hydrochlorate (Am. Journ. Pharm., 1891, 289). It is claimed to be a trustworthy antipyretic, anti-neuralgic, and antirheumatic, in doses of one to two grams.—Pharm. Ztg., 1893, 160.

*Tolypyrine* or *p*-tolylidimethylpyrazolon forms colorless crystals, melting at 136–137°, soluble in 14 parts of water, very soluble in alcohol. It has a very bitter taste. Towards ferric chloride and nitrous acid it reacts like antipyrine. As an antipyretic, four grams are as effective as 5–6 grams antipyrine.—Pharm. Ztg., 1893, 183.

*Tests distinguishing tolpyrine and antipyrine*, and which will also indicate mixtures of the two, are given by Dr. R. Stock: (1) Tolpyrine in *two per cent.* solution will give a precipitate with an excess of sodium hydrate; antipyrine solutions must contain at least *five per cent.* in order to precipitate with this reagent; (2) the melting point of antipyrine is 113°, of tolpyrine 136–137° C.; mixtures containing 10, 25 and 50 per cent. tolpyrine show the same melting point of 94° C.; with 75 per cent. tolpyrine the greater portion melts at 94°, but complete liquefaction requires 120°; with 90 per cent. tolpyrine the mixture gradually melts between 100° and 130°.—Pharm. Ztg., 1893, 192.

*Sodium Carbonate*, in form of small crystals, is prepared according to a German patent, by adding to 100 parts of the effloresced carbonate 70 parts of water 80–90° C.; by mixing the doughy mass the carbonate unites with the water, swelling into a mass of fine crystalline needles, which after cooling can be at once put into suitable packages. A foaming preparation for washing is obtained if in the water used to mix with the soda, there be dissolved a desirable quantity of soap.—(Ztschr. f. angew. Chemie), Pharm. Centralhalle, 1893, 171.

*Fatty oils in mineral oils* may be detected if present to the extent of *one per cent.* by heating 15 grams of the sample with 100 cc. of a 10 per cent. alcoholic solution of potassium hydrate for one to two hours; after cooling, an equal volume of water is added and the mixture filtered through a water-wetted filter, the filtrate neutralized with hydrochloric acid and calcium chloride added when an insoluble calcium soap will separate out if a vegetable or animal fat was present in the sample. For quantitative work the method is also suitable,

providing the fat is present in not too large quantity, as the calcium soap in any quantity lumps together and prevents washing; for this purpose the first filtrate and washings are concentrated to 100 cc., neutralized, precipitated with calcium chloride, the precipitate collected upon a weighed filter (dried at 100° C.), washed with as little water as possible to remove the chlorides, dried at 110° C. and weighed; by ignition, the weight of CaO is found, which subtracted from the weight of the precipitate, gives the weight of the fatty acid anhydrides. To calculate the weight of the fat, the glycerin anhydride corresponding to calcium oxide must first be ascertained, which is done by multiplying the weight of the CaO by 0.774; then adding this and the weight of the fatty acid anhydrides, there results the weight of the fat in the quantity taken for analysis.—Dr. J. Klimont, *Chemiker Ztg.*, 1893, 543.

*Sucrol*, the trade name finally adopted for *p*-phenetol-carbamide was noted in the *Am. Jour. Pharm.*, 1892, 611; it is best adapted for its uses in a fine crystalline form. It melts at 160°, is soluble in alcohol, ether, hot hydrochloric and acetic acids; 100 cc. water at 20° dissolve 0.16 gm., at 80° 0.65 gm.; it has about 200 times the sweetening power of sugar. There is some difficulty in moistening the *powdered* sucrol, but this is overcome by using it in minute crystals; used for sweetening liquids, like tea, coffee, etc., the hot liquids should be poured on the sucrol previously placed in the cup. In pharmaceutical use as a sweetener, sucrol has not the power of overcoming the intensely bitter taste of drugs; a solution containing quinine sulphate 1.0, sulphuric acid six drops, distilled water 100.0 and sucrol 0.1 tastes intensely bitter, acid and sweet at the same time; in a powder containing morphine hydrochlorate 0.05, starch 2.50, and sucrol 0.05 the bitter taste is disguised better than is possible with sugar; in substituting sucrol for sugar as in the above formula some inert powder must be introduced to make up the quantity. Physiological experiments by Dr. Paschkis proclaim sucrol a harmless substance, it not interfering with digestion, respiration or circulation; administered for some time the urine remains normal, traces of sucrol are only to be found in it after taking large doses (0.5 or more). As a test for sucrol, Dr. Berlinerblau boils for a short time a small quantity in a test tube with 2–3 drops each of carbolic and sulphuric acids; after cooling the syrupy, red liquid is poured into half a test-tubeful of water, thoroughly mixed and

then either sodium or ammonium hydrate solution added in such a way as to form a distinct layer without mixing; at the line of contact there is first produced a blue ring, which intensifies upon standing and later spreads throughout the alkaline solution; using sodium hydrate the color has a tinge of violet, with ammonium hydrate a pure blue. In complex mixtures the sucrol should first be extracted with ether and the ether-residue used.—(Therap. Blaetter) Oesterr. Ztschr. f. Pharm., 1893, 261.

*Crude carbolic acid and wood tar* can be made soluble in water by substituting crude oleic acid for the powdered rosin in the formulas given in the Am. Journ. Pharm., 1893, 221. Using the so-called 100 per cent. crude carbolic acid, a product results, soluble in any portion of water and makes a clear solution with petroleum ether. Using the 50 per cent. carbolic acid it was impossible to get a product dissolving in water or even forming an emulsion. *Birch-tar*, by the modified formula, gave an almost solid mass, which, with water, gave after some time, a turbid solution; but, here again, no proportions could be ascertained so as to make a clear solution. *Fir-tar*, however, by the modified formula, gave a satisfactory preparation.—E. Hirschsohn, Pharm. Ztschr. f. Russl., 1893, 148.

## RISE OF SALT SOLUTIONS IN BIBULOUS PAPER.<sup>1</sup>

BY E. FISCHER AND E. SCHMIDMER.

Schönbein's experiments have shown that when bibulous paper is dipped into an aqueous solution of a salt, the water rises more quickly than the salt, and that the relative height attained by the latter is different for different substances; it is possible, therefore, to recognize the presence of the several constituents of a solution by taking advantage of this difference in behavior. The authors are of opinion that the separation referred to is brought about by the difference in the diffusibility of the dissolved substances, a view which is supported by the fact that in the case of two salts, the one with the greater diffusion velocity rises more rapidly in the bibulous paper; the diffusion phenomena of all solutions which moisten bibulous paper can, in fact, be studied in this way just as well as with the aid of membranes. The apparatus employed for the

<sup>1</sup> *Annalen*, 272, 156-169; *Jour. Chem. Soc.*, 1893, *Abstr.* ii, 109.



purpose consists of a glass tube, in which six cylindrical rolls of bibulous paper are placed end to end, so that they are in close contact with the walls of the tube and with one another; the end of the tube is then dipped into the solution to be examined, and kept vertically in this position at the ordinary temperature until the fifth roll is thoroughly moistened, which is usually the case at the end of three or four days' time. The glass tube is then broken at the points where the rolls touch one another, the papers separately extracted with water, and the solutions examined.

Employing a solution of sodium chloride (10 grams) and barium chloride (10 grams) in 100 cc. of water, the proportion of the former to the latter expressed in grams was found to be 1.022, 1.230 and 1.364 in the rolls 1, 3 and 5 respectively, showing that the more diffusible sodium salt rises more rapidly than the barium salt.

With a solution of crystalline ferrous ammonium sulphate (10 grams) in 100 cc. of water, the proportion of iron to ammonia in the fourth roll was found to be 1 : 1.686 when the proportion in the double salt is taken as 1 : 1; with a cold saturated solution of the same salt, the proportion in the fourth roll was 1 : 1.004; and in the fifth, 1 : 0.993. Similar results were obtained with solutions of ferrous potassium sulphate and nickel potassium sulphate; the dilute solutions showed a considerable amount of dissociation, whereas in saturated solutions the dissociation was inappreciable.

Further experiments carried out in a similar manner showed that the double salts formed by mercuric chloride with the chlorides of sodium and lithium are decomposed by water, but not by alcohol; mercuric ammonium chloride, however, is not decomposed by either solvent.

The following double salts,  $\text{NaH}(\text{NH}_4)\text{PO}_4 + 4\text{H}_2\text{O}$ ;  $\text{KCN}$ ,  $\text{AgCN}$ ;  $\text{KNaC}_4\text{H}_4\text{O}_6 + 4\text{H}_2\text{O}$ , do not undergo dissociation in aqueous solution; the compound of dextrose with sodium chloride,  $2\text{C}_6\text{H}_{12}\text{O}_6 + \text{NaCl}$ , on the other hand, is partially separated into its components.

From experiments with solutions of naphthalene picrate, and of methylindole picrate in acetone and in alcohol, it would seem that no decomposition takes place.

The diffusion phenomena of ferrous ammonium sulphate, of the compound  $2\text{C}_6\text{H}_{12}\text{O}_6 + \text{NaCl}$ , and of mercuric sodium chloride were also examined with the aid of Rüdorff's apparatus; it was found



that although the separation of the components of the first two substances in a given time is more effectively accomplished with the aid of membranes than with bibulous paper, the contrary is true in the case of the mercuric sodium chloride.

## THE PHOTOGRAPHIC PROPERTIES OF CERIUM SALTS.

BY MM. AUGUSTE AND LOUIS LUMIÈRE.

We know that cerium yields two principal series of salts. The former are very stable, while the ceric salts are brought back to the lower stage of oxidation even by feeble reducing agents. Some among them, more especially the organic salts, are even reduced spontaneously as soon as formed, so that hitherto it has not been found possible to isolate them.

The easy reductibility of the ceric salts has led us to study the action of light upon these substances, and we have been able to observe that this action effects a rapid reduction which may serve as a basis for the establishment of interesting photographic procedures.

Among the mineral salts which have yielded us the best results we may mention ceric sulphate and nitrate obtained by dissolving ceric hydroxide in sulphuric or nitric acids. The aqueous solutions of these salts have served to saturate sheets of paper, suitably sized and coated with a thin layer of gelatin, which the cerium salt colors an intense yellow. After drying in the dark, the papers were exposed to light under a positive proof. In all the transparent parts the luminous rays reduce the ceric salt to the cerous state, and the paper is decolorized at these parts. This progressive decoloration enables us to follow the action of the light and to stop the impression at the proper moment.

The proof when thus obtained must be treated with a reagent capable of differentiating the cerous from the ceric salt, so as to accentuate and fix the image. In an analogous process with the manganic salts, which we have formerly published (*Bulletin de la Soc. Française de Photographie*, p. 218, 1892), we used the striking oxidizing properties of the manganic salts to form insoluble coloring matters with a great number of substances of the aromatic series. In the same manner, if we treat the proofs with cerium salts, with these reagents we form and fix coloring matters at the

points where the ceric salt has not been reduced by the light. It then suffices to eliminate, by washing, the excess of the reagent as well as the cerous salt to obtain a proof distinctly fixed. It is important that the coloring substance produced should be insoluble, so that it may not be carried away by washing.

We found, on considering their photographic utilization, and on comparing the action of the ferric, cobaltic, manganic and ceric salts upon a great number of substances of the aromatic series, that the ceric salts are capable of yielding colored reactions much more numerous than the salts of the other metals.

Among the most characteristic reactions we may mention the following :

In an acid solution the proofs are gray with phenol, green with aniline salts, blue with naphthylamine  $\alpha$ , brown with amido-benzoic acid, red with parasulphanilic acid, green with the salts of ortho-toluidine, etc. On treatment with ammonia the color changes, it becomes, for instance, violet with aniline, red with methylamine, etc.

Photographic papers prepared with cerium salts possess a much greater sensitiveness than that of the preparations with ferric or manganic salts.—*Comptes rendus*, cxvi, p. 574; *Chem. News*, April 21, 1893, p. 188.

## REACTIONS OF FERRIC SALTS WITH THIOCYANATES.<sup>1</sup>

BY H. M. VERNON.

In these investigations, colorimetric observations were adopted for comparison, and were made in vertical, flat-bottomed tubes, by comparing the solution to be tested with an adjustable column, either of a 0.1 per cent. solution of picrocarmine, or, in some cases, of a dilute solution of ferric thiocyanate, prepared from lithium thiocyanate and excess of ferric chloride. Solutions were examined containing 1, 2, 4, 7, 11, 18, 30 and 100 equivalents of ferric chloride to 1 part of potassium thiocyanate, and diluted to various degrees, ranging from 2- to 120-fold. In equivalent quantities, these two reagents react almost completely at infinite concentration, to form ferric thiocyanate; but solutions less dilute than those mentioned above were too deep in color, whilst solutions containing one or two equivalents of ferric chloride, when diluted above 40 times,

<sup>1</sup> *Chem. News*, 66, 177-179, 191-193, 202-203, 214-215; *Jour. Chem. Soc., Abstr.*, 1893, i, p. 122.

were too weak in tint for colorimetric examination. The decrease in ferric thiocyanate coloration, resulting from the dilution of the solutions from 8- to 120-fold, in the strongest solution, was 27 per cent., in the 30:1 solution over 60 per cent., in the 18:1 solution 73 per cent., whilst diluting from 2- to 32-fold in the case of the 1:1 solution resulted in a reduction of the coloration, amounting to 94 per cent.; the stability of the ferric thiocyanate, therefore, appears to vary regularly with the amount of ferric chloride present; moreover, the amount of ferric thiocyanate formed in these solutions varies with the dilution in accordance with the law of mass. The action of ferric chloride is twofold; in most cases it forms a solution in which the ferric thiocyanate is more stable than in pure water, but in very strong solutions, it exerts a decolorizing and presumably a destructive action on the deep-colored thiocyanate.

The examination of a similar set of solutions, in which the proportion of ferric chloride was kept constant, and that of the potassium thiocyanate varied, indicated that, although the ferric thiocyanate was more stable in a solution of potassium thiocyanate than in water, yet the decrease in color on dilution did not, in this case, follow the law of mass, probably owing to the presence of impurities.

Numerous other experiments with various ferric salts and thiocyanates led to the following conclusions: That the color reactions of ferric chloride, nitrate, sulphate, tartrate, citrate, and acetate with potassium, ammonium, sodium, lithium, calcium, and barium thiocyanates, indicate that the formation of ferric thiocyanate in these cases is dependent on two factors, one being the nature of the acid of the ferric salt, the other the nature of the base of the thiocyanate; the former exerting an action somewhat in accord with the relative affinities of the acids, whilst the latter shows no such relationship. In all these cases, except with the acetate, the color of the ferric salt caused no inconvenience.

Heating the solutions increases the activity of the various reactions, and when those that favor the formation of ferric thiocyanate predominate, an increase of color is observed, and *vice versa*. Therefore, by heating at 20°, 30°, 40°, 50° and 60°, or when decomposition ensued at some intermediate temperature, an increase of color is observed with thiocyanates and ferric salts of monobasic acids, and a decrease with ferric salts of polybasic acids.



SOME AMERICAN "NOVELTIES."<sup>1</sup>

A New York firm has been good enough to favor the American public with an altogether peculiar kind of "Novelties" of which we deem it necessary, in the interest of the good repute of our trade, to say a few words.

"*Ambrettaria*, a powerful synthetic product for perfumery." Although the "discoverers" claim this to be "a product of our chemical laboratory," "*Ambrettaria*" is nevertheless no definite scientific body at all, but a simple mechanical mixture of 5 parts of musk-seed oil (ambrette oil), 95 parts of antifebrin (acetanilid), and traces of artificial musk. These ingredients were recognized and isolated by us with absolute certainty. We determined the melting point and other characteristic features of the antifebrin.

"*Oil Catalpa*, a powerful synthetic product for perfumery." The manufacturer of this product most obligingly condescends to offer perfumers, under this new name, a terpeneol, to which a few drops of ylang-ylang oil have been added, at the "cheap" rate of \$10 per pound. It is to be hoped that no perfumer will fall into the trap.

"*Oil Narcissus*, a powerful synthetic product for perfumery." The person who imagines this product to provide the scent of narcissus will be sadly deceived. This stuff is nothing more or less than the parts of light specific gravity which are obtained as a by-product in the manufacture of terpeneol. As this material is of no value whatever in perfumery, we use it in our works for cleaning parts of machinery. The price asked for this product is the trifling one of \$7.50 per pound.

"*Oil Ylang-Ylang, artificial*." This product does not by any means solve the scientific problem of the synthesis of ylang-ylang in a practical manner, which would be a matter of great importance. On the contrary, we have here to deal with a bald and primitive mixture of cananga oil and Peruvian-balsam oil (cinnamein).

We are quite certain that no one could be found with sufficient assurance to try to place such products upon the European market. Any attempt to do so would only provoke mirth. And the house that dares to place such compounds before the American perfumers surely under-estimates grossly the intelligence of its would-be customers.

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<sup>1</sup> From Semi-Annual Report of Schimmel & Co., April, 1893, p. 70.



## CEPHALANTHIN.<sup>1</sup>

BY CARL MOHRBERG.

By extracting cephalanthus bark with boiling water and fractionally precipitating the extract with lead acetate, in three fractions, there were obtained in the first cephalanthin and coloring matters, in the second a tannin and in the third a saponin. But the greater portion of the cephalanthin is contained in the pressed bark, and is obtained by boiling this with lime water, precipitating the lime with carbonic anhydride, and, finally, the cephalanthin with hydrochloric acid. It is very bitter, even in dilution of 1 : 15,000, very soluble in alcohol, ethyl acetate, ammonia and soda, slightly in hot and cold water, ether and chloroform, not at all in benzene and light petroleum. It is a feeble acid, and displaces carbonic anhydride from carbonates. Its composition is  $C_{22}H_{34}O_6$ ; it begins to liquefy at  $177^\circ$ , and melts at  $180.1^\circ$  (corr.), and in alkaline solution has  $[\alpha]_D = 20.25^\circ$ . Strong sulphuric acid colors it orange, hydrochloric acid violet, sulphovanadic acid pink, dilute gallic acid or strong sulphuric at  $70^\circ$  at first red, then violet,  $\alpha$ -naphtholsulphonic and thymolsulphonic acids violet or reddish-violet. Acids decompose it into a sugar,  $C_6H_{12}O_6$  (whose phenylosazone melts at  $196-198^\circ$ ), and an acid substance, *cephalantein*,  $C_{16}H_{23}O_3$ ; it is thus a glucoside.

The cephalanthus tannin mentioned above is a reddish-yellow powder, soluble in alcohol and hot water, and gives a green coloration with ferric salts. It is probably a mixture of "true tannic acid" with another substance, the cephaletin of Claassen. The cephalanthus saponin is a poison which dissolves the blood corpuscles; it is not very active, however.

Cephalanthin, when injected, acts as a poison, dissolving the blood corpuscles, the coloring matter of which goes into the serum and the urine as oxyhæmoglobin, and is then changed into methæmoglobin. Cramp, vomiting and paralysis appear, and jaundice, caused by an enormously increased secretion of bile. Among the earlier symptoms are movements of the intestines, but neither the heart, vagus nerve, nor vasomotor system is affected. The iron

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<sup>1</sup> *Chem. Centr.*, 1892, ii, 363; from *Arb. Pharm. Inst. Dorpat*, 8, 20-50; *Jour. Chem. Soc., Abstr.*, 1893, i, p. 112; compare also E. M. Hattan, *Amer. Jour. Phar.*, 1874, p. 310, and E. Claassen, *Phar. Rundschau*, 1889, p. 131.

separated out in the liver gets into the spleen, lymphatic glands and marrow, and is used up in the formation of blood; a part goes into the kidneys.

## CYTISINE AND ULEXINE.<sup>1</sup>

BY A. PARTHEIL.

The author has already stated (1891) that cytisine from laburnum and other varieties of *Cytisus* is identical with Gerrard's ulexine from *Ulex europæus*, and that it has the formula  $C_{11}H_{14}N_2O$ . For the preparation of the alkaloid from either source, the pulverized seeds are extracted in a percolator with 60 per cent. alcohol acidified with acetic acid; chloroform is to be recommended for extracting the free base, but its application, in the manner described by Buchka and Magalhães (1891), is not desirable, as an emulsion is formed. Gerrard and Symon state that a second base is present along with ulexine in the seeds of *Ulex europæus*, but the author failed to recognize it; he has, however, separated choline from the seeds of the *Cytisus* species.

Small quantities of cytisine base may be freed from the accompanying coloring matters by crystallization from boiling light petroleum; the pure base crystallizes from absolute alcohol in large, colorless, anhydrous prisms which are not deliquescent, melts at 150–153°, and is readily soluble in water, alcohol and chloroform, less so in benzene and amyl alcohol, almost insoluble in cold light petroleum, and insoluble in pure ether. Its specific rotatory power in aqueous solution is  $[\alpha]_{D17}^{\circ} = -119.57$ , and analysis confirmed the formula given above. For the detection of the alkaloid, Magalhães' reaction serves; this consists in adding thymol to a solution of cytisine in concentrated sulphuric acid and heating, when a yellow coloration, finally passing into an intense red, is produced.

The author next describes a number of derivatives of cytisine, most of which are already known, and compares them with the corresponding derivatives of ulexine, thereby proving the identity of the two alkaloids. Among these are the nitrate,  $C_{11}H_{14}N_2O \cdot HNO_3 + H_2O$ , which has a specific rotatory power in aqueous solution  $[\alpha]_{D17}^{\circ} = -82.4$ , the two platinochlorides  $(C_{11}H_{14}N_2O)_2 \cdot H_2PtCl_6$  and  $C_{11}H_{14}N_2O \cdot H_2PtCl_6 + 2\frac{1}{2} H_2O$ , the aurochloride melting at 212–213°, the acetyl derivative melting at 208°, and the methiodide

<sup>1</sup> *Arch. Pharm.*, **230**, 448–498; *Jour. Chem. Soc.*, 1893, Abstr. i, p. 119.

which melts at  $270^{\circ}$ . Methylcytisine melts at  $134^{\circ}$ ; the platinochloride crystallizes with  $2\frac{1}{2}$  mols.  $H_2O$ , and the aurochloride melts at  $196^{\circ}$ . Ethylcytisine is a yellow liquid, and yields a platinochloride which crystallizes with 1 mol.  $H_2O$ . Magalhaës' dimethylcytisine forms a platinochloride crystallizing with  $2\frac{1}{2}$  mols.  $H_2O$ , and gives rise to dimethylcytisine methiodide when heated on the water-bath with methyl iodide; the methiodide decomposes on boiling with concentrated aqueous potassium hydroxide with the evolution of trimethylamine, whilst chloroform extracts from the cold solution a *base* giving an amorphous, yellow platinochloride,  $(C_{10}H_{13}NO_2)_2, H_2PtCl_6$ . On distilling cytisine with soda lime, a base,  $C_9H_{13}N$ , probably a pyridine derivative, is obtained; this is, perhaps, related to the base  $C_{10}H_{13}N_2O$ , just mentioned. The alkaloid gives no evidence of the presence of the group  $CO$ , in that it does not react with phenylhydrazine.

The precise constitution of cytisine is still obscure, but its behavior towards methyl iodide, acetic anhydride and nitrous acid shows that one of its nitrogen atoms is in secondary combination; the second nitrogen atom is either in tertiary or quaternary combination. That the oxygen atom exists neither in the form of methoxyl nor hydroxyl is proved by the fact that methylcytisine does not yield an acetyl derivative. The research is being continued.

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## THE COMPOSITION OF SOME COMMERCIAL SPECIMENS OF ACONITINE.

BY WYNDHAM R. DUNSTAN AND FRANCIS H. CARR,  
Assistant in the Research Laboratory of the Pharmaceutical Society.

In our search for the most readily available source from which to obtain pure aconitine, we examined a number of commercial specimens of this alkaloid, English and foreign. For eleven of these specimens (I–II) we are indebted to Dr. J. W. L. Thudichum, who collected them some years ago, and kindly offered them to us for examination. Dr. Thudichum found that these specimens varied enormously in toxic power, many being inert, others more or less poisonous, whilst only one or two were highly toxic. The remainder of the specimens have been purchased during the past two years.

The process employed in examining them was essentially that described in connection with the separation of isaconitine from the



total alkaloids of *Aconitum Napellus*, by means of which it was possible to ascertain the presence of aconitine and isaconitine, and also of aconine and homisaconitine (homonapelline), as well as to form an approximate estimate of the proportion of crystalline aconitine to that of the amorphous alkaloids. In several instances the amount of aconitine present was too small to allow of its isolation either as crystalline base or crystalline salt. When this was the case, the presence or absence of aconitine was ascertained by observing whether a dilute solution of the mixed salts produced the characteristic tingling sensation on the tongue. The difficulty of separating the alkaloids has often been great, owing to the small amount of some of the specimens.

The results are as follows:

(1) "Aconitine, Pure" (German).—A yellowish-white, amorphous powder which melted indefinitely near  $107^{\circ}$ . When dissolved in dilute hydrobromic acid, it furnished a highly colored solution. From this liquid, pure isaconitine salt was eventually obtained, in amount corresponding with the presence of about 20 per cent. of the alkaloid in the original substance. Aconitine was present only in relatively small quantity, and it was not found possible to isolate it. Aconine, and apparently homisaconitine, were also present.

(2) "Aconitine, Crystallized" (French).—A white, crystalline powder melting near  $187^{\circ}$ . It completely dissolved in cold water, and proved to be the nitrate of an alkaloid, not the base itself. The alkaloid was regenerated and dealt with in the usual manner. A considerable quantity of pure aconitine hydrobromide was obtained, and from this, pure crystalline aconitine (m. p.  $188-189^{\circ}$ ) was prepared. A smaller quantity of isaconitine hydrochloride was isolated, whilst other amorphous bases (aconine, homisaconitine, etc.) were observed in small quantity. The nitrate, of which the original substance was composed, contained about 70 per cent. of aconitine salt.

(3) "Aconitine, Pure" (English).—A yellowish-white, amorphous substance melting indistinctly near  $88^{\circ}$ . Its solution in dilute hydrobromic acid was highly colored. A considerable quantity of alkaloid soluble in ether was isolated; this was chiefly isaconitine. No crystalline aconitine salt could be isolated from the small quantity of material at our disposal. The physiological action of the acid solution indicated that a small quantity of this alkaloid was present, but the specimen was chiefly composed of amorphous bases.



(4) "Aconitine, Pure" (German).—A dirty white, amorphous powder melting at  $111^{\circ}$ . The solution in dilute acid was yellow. No crystalline aconitine salt could be isolated, although a small quantity of the alkaloid was detected by its physiological action. Some isaconitine was obtained in addition to other amorphous alkaloids, including aconine.

(5) "Aconitine, Crystallized" (German).—A collection of small white crystals melting at  $170^{\circ}$ . It yielded a considerable quantity of crystalline aconitine hydrobromide, from which the pure crystalline base melting at  $188-189^{\circ}$  was regenerated. Isaconitine was also obtained. Rather more than two-thirds of the original material was aconitine.

(6) "Napelline" (German).—Napelline was the name given by Hübschmann to what seems to have been a mixture of the amorphous alkaloids of *Aconitum Napellus*. A brown amorphous powder melting near  $120^{\circ}$ , and not completely soluble in dilute acid. The highly colored solution furnished some isaconitine. It also contained aconitine and considerable quantities of amorphous alkaloid, partly aconine. The original substance was probably the total alkaloids of *A. Napellus*, from which some of the aconitine had been removed.

(7) "Aconitine, Pure" (English).—A yellowish, amorphous powder melting at  $85^{\circ}$ . It partially dissolved in dilute acids, forming a colored solution from which no crystalline aconitine salt could be isolated, although the presence of a small quantity of this alkaloid was detected by its physiological action. About two-thirds of the alkaloid consisted of amorphous alkaloids, the remainder being resinous substances, apparently non-alkaloidal, and a little aconine.

(8) "Aconitine from *A. Napellus*" (German).—A yellow, amorphous powder melting between  $105^{\circ}$  and  $110^{\circ}$ . Its solution in dilute acid was colored. A considerable quantity of crystalline isaconitine salt was separated, but the amount of aconitine was too small to admit of isolation. More than one-fifth of the original substance turned out to be isaconitine, the remainder being other amorphous bases, a small quantity of aconitine, and some non-alkaloidal substance.

(9) "Aconitine" (English).—A nearly white, amorphous powder, dissolving in dilute acid, forming a dark colored solution. The substance was chiefly composed of amorphous bases with very little aconitine.

(10) "Aconitine Muriate" (German).—A yellow, uncrystalline powder melting indistinctly at  $86^{\circ}$ . Its solution in water was highly colored, and produced only a feeble tingling sensation on the tongue. It was chiefly isaconitine hydrochloride contaminated with the hydrochlorides of other amorphous alkaloids, and with a trace of aconitine hydrochloride.

(11) "Aconitine Sulphate" (German).—A reddish, crystalline powder melting indefinitely below  $128^{\circ}$ . Its aqueous solution was red. The alkaloid was regenerated, and was proved to be chiefly isaconitine with a little aconitine.

(12) "Aconitine Nitrate" (German).—A dark yellow, amorphous substance melting near  $62^{\circ}$ . The aqueous solution was yellow. It furnished no crystalline alkaloid, but the existence in it of a small quantity of aconitine was revealed by its physiological action. Some isaconitine was isolated, but it was contaminated with other amorphous alkaloids.

(13) "Aconitine, Pure, from *Aconitum Napellus*" (English).—A yellowish white, crystalline powder melting at  $186-187^{\circ}$ . It dissolved completely in dilute acid, forming a yellow solution. A large quantity of pure aconitine was isolated, together with a small quantity (about 3 per cent.) of isaconitine.

(14) "Aconitine, Pure, Crystallized, from *Aconitum Napellus*" (German).—A collection of small, nearly white, distinct crystals melting at  $187.5^{\circ}$ . It dissolved in dilute acid, forming an almost colorless solution, which furnished a large quantity of pure aconitine salt. The regenerated alkaloid melted at  $188.5^{\circ}$ . This specimen consisted of almost pure aconitine.

(15-17) "Aconitine, Amorphous, from *Aconitum Napellus*" (German).—Three separate specimens of this material were examined. It is a yellow, amorphous powder, dissolving in dilute acid with the production of a colored solution. In each case aconitine, isaconitine, homisaconitine, and aconine were isolated, but the amount of aconitine obtained varied greatly; in one instance, as much as 20 per cent. of the substance was found to be aconitine, whilst in another as little as 5 per cent. was present. These products appear to represent the total alkaloids of *A. Napellus*.

In the light of these results, it is not surprising to learn that great variations have been observed in the toxic power of commercial specimens of aconitine.

For medicinal purposes, nothing should in future be employed as aconitine but the pure crystalline alkaloid melting at 188–189°, and having the other characteristic properties recorded in Part I (Trans., 1891, 59, 271) of this enquiry (see also on this point, *Pharm. J.*, 3, 23, 765).

Of the specimens now examined, only two (13, 14) approach this standard, and are entitled to be called aconitine. It is clear from the results which are here recorded that the fact that a specimen of this alkaloid is crystalline cannot alone be accepted as sufficient evidence of purity, as some physiologists have assumed. In the case of the salts, the crystalline nature of the specimens is no criterion that the substance is an aconitine compound, since the salts of isaconitine are also crystalline.

It has already been remarked that most of the specimens described in this paper were collected some years ago, and since then, especially during the last two years, a marked improvement has occurred in the quality of commercial aconitine. It is now possible to purchase in commerce a nearly pure crystalline aconitine, represented by specimens (13) and (14), although the crude, amorphous alkaloid is still largely prepared and sold, because this satisfies the present requirements of the British Pharmacopœia.

Until now, it has not been possible to make anything approaching to a chemical examination of commercial aconitine, since the nature and properties of its chief constituents were either unknown or open to doubt. Even now it is not possible to make a complete examination, as there is certainly one, probably two alkaloids which still require investigation, making in all four, or possibly five, distinct natural alkaloidal products from *A. Napellus*.

No method is at present known for the quantitative determination of the highly toxic alkaloid aconitine. Now that isaconitine is known to be a constituent of the plant, and since it, like aconitine, furnishes benzoic acid when hydrolysed, the method suggested by Wright for the estimation of aconitine in the crude alkaloid, by calculating from the weight of benzoic acid obtained on hydrolysis, can no longer be accepted as valid.—Research Laboratory of the Pharmaceutical Society, London.—*Jour. Chem. Soc.*, 1893, pp. 491–495.



## DETECTION OF EXTRACTED TEA.

By W. A. TICHOMIROW.

The author has made an examination of such tea as is used for the falsification of genuine tea. If dry extracted tea is covered with a cold, saturated solution of copper acetate, the blue color of the liquid remains unchanged for months. With dry fresh tea (not extracted), the original blue color of the liquid is found on the second day to have been changed into a greenish blue, and subsequently to a pure green. The leaflets of the fresh (not extracted tea), remain strongly contracted and rolled up even after steeping in the water for weeks, whilst tea which has been previously extracted unrolls perfectly without any previous immersion in water.

The characteristic distinction between extracted and fresh tea is shown by the idioblasts. If microscopic sections of leaves which have been steeped for from 1 to 4 days in a cold saturated solution of copper acetate are touched with a drop of the "liquor ferri acetici" of the Russian Pharmacopœia (specific gravity 1.134 to 1.138), and examined under the microscope, all the histological elements which contain tannin have taken a deep, black-blue color. The tannins are fixed in their normal places by the previous treatment with copper acetate.

In leaves which have been previously extracted, the cell walls have been previously permeated by the tannin dissolved in water, whilst in fresh tea they remain colorless, because the tannins are found normally not in the idioblasts, but in the surrounding parenchyma cells. The shrivelling and the inability to unroll in water the tea-leaves which have not been previously extracted with hot water must depend on the formation of a dense, solid copper tannate, insoluble in water. It is a kind of tannin which prevents the turgescence of the tissues.

E. Hanausek (*Zeit. f. Nahrungsmittel-Untersuchung*) detected the appearance of a green color also in extracted tea, and in his experiments the idioblasts did not show sharply and consistently the expected microchemical reactions, probably in consequence of the complete exhaustion of the leaves. Hanausek's further experiments had the purpose of determining the refractive index of the infusion of tea as a distinction between extracted and recent tea.



As these experiments are not completed, and as the determination of the proportion of extract afford a more certain basis than the indices of refraction which do not differ very widely among themselves, we must refer to the original.—*Pharm. Zeit. Russland's; Chem. News*, April 28, 1893.

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## DAPHNIDIUM CUBEBA, NEES.

By E. M. HOLMES, F.L.S.

Curator of the Museum of the Pharmaceutical Society of Great Britain.

Some degree of uncertainty has hitherto been attached to the plant yielding the false cubebs, referred by most authorities on materia medica to *Daphnidium Cubeba*. This name was given by Nees van Esenbeck ("Syst. Laurinearum," p. 615) to a plant cultivated in Cochin China, and described by Loureiro ("Flora Cochinchinensis," I, p. 307, No. 7) under the name of *Laurus Cubeba*. The plant does not, however, appear to have been seen by Nees, who simply quotes Loureiro's description. Hanbury, in his "Notes on Chinese Materia Medica," (*Pharm. Journ.* [2], vol. iii, p. 206) gives an illustration of the fruit, taking as his guide for adopting the name of *Daphnidium Cubeba*, the known laurineous structure of the fruits and their likeness to cubebs, but stating that the plant was unknown to modern botanists. Subsequently, Dr. F. Porter Smith<sup>1</sup> followed Hanbury's identification. That some doubt existed in the minds of the authors of "Pharmacographia" on this identification is, however, evident from the remark in the second edition of that work, "In the south of China the fruits of the *Laurus Cubeba*, of Loureiro, have frequently been mistaken for cubebs. The tree which affords them is unknown to modern botanists. Meissner refers it doubtfully to the genus *Tetranthera*." In De Candolle's "Prodromus" (vol. xv, pt. I, p. 199), Meissner remarks concerning *Daphnidium Cubeba*, Nees, "Antheræ 4, locellatæ (hinc certe non Daphnidii generis)." By Bentham and Hooker, f. ("Gen. Plant." vol. iii, p. 101) the genus *Tetranthera* is sunk under *Litsea*, therefore the present name of *Laurus Cubeba* should be *Litsea Cubeba*, Benth. and Hook. f.

A surer and somewhat more exact means of identifying the fruits with the plant yielding them has recently come into my hands through the kindness of our corresponding member, Professor van

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<sup>1</sup> "Chinese Materia Medica," pp. 79, 83.

Eeden, of Haarlem. I had asked Dr. Van Eeden for specimens of any plants yielding cubebs that he might be able to procure. In response to this request, he sent a very fine series of plants, one of which, named Krangéan, and identified by him as *Tetranthera citrata*, Nees, was, he informed me, the source of a fruit that is regularly sold as cubebs. This at once suggested to me a comparison of the fruits with those of the so-called *Daphnidium Cubeba*. Except in the stronger verbena-like taste I could perceive no difference in these fruits. At my request Dr. A. De Wevre, who has been making a histological study of the true and false cubebs in the Museum of the Society, cut some sections of Dr. Van Eeden's specimen, of Dr. Porter Smith's specimen of *Daphnidium Cubeba*, and of the *Daphnidium Cubeba* in the Museum of the Society, derived from the same parcel as that examined by Mr. J. O. Braithwaite (*Pharm. Journ.*, [3], xvii, p. 231).<sup>1</sup> The structure of all three proved to be identical. As Dr. De Wevre will subsequently publish in his thesis on cubebs the details of the structure of this fruit, it is not necessary to give them here. It will be sufficient for purposes of identification to remark that the layer of sclerogenous cells of the testa in *Tetranthera citrata* is composed of extremely narrow cells without a recognizable lumen, whilst that of *Piper Cubeba* is formed of large oblong cells having a well-marked lumen. It may be assumed, therefore, as proved that the so-called *Daphnidium Cubeba* of commerce must in future be referred to *Litsea citrata*, Bl. ("Bijdrag," p. 565), but that the identity of that plant with the *Laurus Cubeba* of Loureiro is uncertain.

It is further of interest to remark that the fruits of *Litsea citrata* are identical with the "citronelle fruits" distilled by Messrs. Schimmel & Co., under the name of *Tetranthera citrata*, which are stated by them to yield citral, the flavoring principle of oil of lemon, to the extent of 30 per cent. of the oil. Citral has an odor between that of lemon and verbena, and it is remarkable that Mr. J. O. Braithwaite, in his examination of the fruits of *Daphnidium Cubeba*

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<sup>1</sup> I have communicated with Messrs. Braithwaite and Farr, who admit that my interpretation of the structure of the fruit is the correct one, and that the description they have given is incorrect, they having been misled by imperfectly cut sections. It may be mentioned that owing to the extreme hardness and fragility of the testa as compared with the soft tissue of the pericarp it is extremely difficult to make a good section of the fruit.

(*Pharm. Fourn.* [3], vol. xvii, p. 231) obtained a volatile oil having an agreeable odor between that of the oils of lemon and verbenia. This odor and flavor become weaker when the fruits are kept, and this fact may perhaps account for the similarity of the "citronelle fruits" with those of *Daphnidium Cubeba* having hitherto remained unnoticed.

Dr. Greshoff found the alkaloid laurotetanine in the fruits of *Tetranthera citrata*, Nees, and an alkaloid was also found by Mr. J. O. Braithwaite in those of *Daphnidium Cubeba*. It must be admitted, however, that the same reactions were not obtained by both chemists, nor does the sp. gr. of the volatile oil obtained by Mr. Braithwaite agree exactly with that given by Messrs. Schimmel & Co. for the volatile oil of *Tetranthera citrata* (*Phar. Fourn.* [3], vol. xix, p. 327). These differences, however, may have been due to differences in the mode of operation, and further experiments may confirm their identity. The use of the fruits by the Chinese probably depends partly on the properties of the volatile oil and partly on those of the alkaloid. It may be hoped that the alkaloid, obtainable from the fruits after distillation, may be extracted and its therapeutical properties examined. Being at present a waste product, it could probably be obtained in quantity at a moderate cost.—*Pharm. Jour. and Trans.*, April 19, 1893, p. 846.

## NOTES ON ESSENTIAL OILS.<sup>1</sup>

*Camphor oil.*—Since the examination of this oil by Messrs. Schimmel, and the publication of their suggestions as to the practical application of its constituents, in 1885, considerable attention has been directed to it, but the importation from Japan has fallen off. As a material for artists the more volatile portion has been found very useful, as its capacity for dissolving resins is greater than that of turpentine or any other essential oil.

*Cassia Oil.*—The previous reports<sup>2</sup> have furnished ample information as to the source and preparation of this oil, but there is still some uncertainty as to the conditions influencing its quality. Oil containing only from 45 to 55 per cent. of cinnamic aldehyde has

<sup>1</sup> From the *Bericht* of Messrs. Schimmel & Co., for April, 1893; *Pharm. Jour. and Trans.*, 1893, p. 849.

<sup>2</sup> See *Pharm. Journ.* [3], xx, 264, 836; *Amer. Journ. Pharm.*, 1889, 370, 575.



again come into the Chinese market, and it is stated to be absolutely pure. This deficiency is accounted for by the statement that young and imperfectly ripened material always yields such oil. On examination, Messrs. Schimmel found that the oil was not to be distinguished by its external appearance and characters from oil of the best quality. It did not contain rosin, fat, oil, petroleum, or any of the coarser adulterants. This oil has been rejected by the Hong Kong merchants, but some of it has found its way to India and places where low price is the chief attraction and there is but little appreciation of quality. The explanation given by the Chinese of its inferior character cannot be summarily rejected, since it is possible that young leaves may contain a considerable proportion of the acetic ester of cinnamyl ( $C_9H_9OAc$ ), and that cinnamic aldehyde may be formed from that by oxidation during the growth of the plant. But it is more probable that this inferior oil is derived from other parts of the plant, or from another species of the genus of *Cinnamomum*. Messrs. Schimmel remark that the previous history of this subject furnishes no inducement to believe the statements made by the Chinese, and they reserve their opinion until they shall have examined the raw material from which the inferior oil is obtained. Meanwhile, they recommend that the determination of cinnamic aldehyde should be made the test of quality in purchasing the oil, and they state that the oil imported since last October has been found to contain at least 85 per cent. and sometimes as much as 94 per cent. of cinnamic aldehyde.

*Bergamot Oil.*—For many years the examination of this oil has been limited to the determination of its physical characters, and it is only within the past year that the acetic ester of linalool has been recognized as its most important constituent. This fact pointed to a means of determining the quality of the oil, as the ester is the odorous constituent. By a saponification method, described under the head of "Lavender Oil," the normal amount of ester has been found to be about 40 per cent., and the test may be relied upon for ascertaining the quality of bergamot oil. The chief adulterants are turpentine, orange and lemon oils. All three reduce the solubility of bergamot oil in dilute alcohol, as well as the specific gravity, and, of course, the amount of ester. The presence of orange oil is also indicated by its high optical rotation. In the examination of bergamot oil, it is necessary in the first place to determine the specific



gravity and the rotatory power. The alcohol test requires to be made more stringent—the oil should dissolve at  $20^{\circ}$  C., in from 1.5 to 2 volumes of 80 per cent. alcohol. Slight turbidity, increasing on addition of more alcohol, is due to separation of bergaptene; but no drops of oil should remain undissolved. Distillation of the oil under normal atmospheric conditions causes considerable decomposition, and this treatment is quite useless for the purpose of valuation. The results of a long series of experiments have proved that oil containing a high amount of ester is distinguishable from those kinds containing smaller amounts by the higher specific gravity and greater solubility in alcohol of 80 per cent. Oil of undoubted purity, pressed by Messrs. Schimmel, was found to contain more ester than any other kind, and it is probable that a perfectly pure oil is not to be met with in commerce. Experiments with mixtures of bergamot oil and turpentine, orange or lemon oils, have shown that the ester determinations may be fully relied upon, and as a minimum amount there should be 38 per cent. The specific gravity should not be under 0.881 at  $15^{\circ}$  C., and the optical rotation not more than  $20^{\circ}$  with a column of 100 mm. Practical experience has long proved that distillation of the oil is injurious, and that the much less convenient process of pressing must be preferred on that account. Experiments have shown that distilled oil contains much linalool, as a consequence of the decomposition of the ester, and by acetylating a distilled oil containing only 12 per cent. of ester the amount of ester was increased to 61.5 per cent. Even pressed bergamot oil contains some linalool, and a sample containing 37 per cent. ester was found after acetylation to contain 47 per cent. ester. It may probably be assumed that the oil obtained by distilling the residue of the pressing operation is used for adulterating the pressed oil, and that would account for the frequently small amount of ester, as well as the low specific gravity of the commercial oil as compared with absolutely pure pressed oil.

*Lemon Oil*—As the general result of further investigation, it has been found desirable to apply tests of increased stringency in judging of the purity of this oil. The determinations of optical rotation and specific gravity are of special importance; since the admixture of turpentine oil—almost the only adulterant—has the effect of reducing the rotatory power and increasing the specific gravity. By comparison of a number of samples with oil of known purity,

expressed by Messrs. Schimmel, it appears that pure lemon oil of good quality should have a specific gravity of 0.858 to 0.859 at 15° C., and an optical rotation not less than + 60°, with a column of 100 mm. But these data are by no means sufficient indications of quality, which can only be determined satisfactorily by ascertaining the amount of citral present. It has not yet been possible to do that; but Messrs. Schimmel are endeavoring to devise a method suitable for that purpose, and they have reason to believe that they will succeed. In reference to the recently established production of a concentrated lemon oil—wholly or partially deprived of terpene—a question is raised as to what may be expected to become of the by-products of that operation, consisting of a mixture of pinene and limonene, possessing some lemon odor but almost destitute of citral.

*Sweet Orange Oil.*—Similar observations of the characters of this oil have been instituted, and the conclusion arrived at is that it should have a specific gravity of .850 at 15° C., and a rotation of at least 95°. Addition of turpentine to the oil reduces the rotation and increases the specific gravity.

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### CLOVE CULTIVATION.<sup>1</sup>

Undoubtedly the principal and most important cultivation of Zanzibar is that of the clove tree. It is grown wherever the soil is suitable, from the large and extensive plantations belonging to the Sultan and his family to the few trees owned by the more humble cultivator. The soil most suitable for clove cultivation is “a dark loam, having underneath a layer of dusky yellow earth, intermixed with gravel;” also “a yellowish or reddish stiff clay;” and these typical soils are all found on the island. Certainly the clove tree requires clay, and I observed there was always a marked difference in appearance between trees growing on a clay soil—red for preference—and those found on a lighter ground; and the finest trees were always either growing on a red clay, or else a stiff dark red to darker chocolate soil. The clove tree (*Caryophyllus aromaticus*), is a native of the Moluccas, and was introduced into Mauritius in 1770 by the French, and at the end of the century an Arab, by name Harameli-bin-Saleh, accompanied a French officer from Zanzibar to

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<sup>1</sup> *Consular Report*; Phar. Jour. and Trans., April 1, 1893, p. 808.

Bourbon and obtained permission to take back a small quantity of seeds and plants with him. This was the commencement of clove cultivation in Zanzibar, Harameli making the first plantation at Mitoni, on the road to Chueni; and the cultivation rapidly spread. The different methods by which this cultivation is now carried on are evidently borrowed from the French, and the Swahili word for clove, "garafu," is probably a corruption of the French word "giroflier."

*Germination.*—The seeds are first soaked in water for three days, and when germination has set in they are planted out 6 inches apart, with the bud end above ground, into shaded beds—the usual practice being to put down two seeds together in case of failure. If a large number of plants are to be grown the seeds are only put down 3 inches to 4 inches apart. Beds are about 6 feet wide, and of any length. They are shaded by a flat framework of sticks, over which is placed a layer of either dry grass or cocoanut leaves; the height of this framework is about 3 feet to 3½ feet. There is no regular rule for this, the important point being to keep the beds constantly damp. The slaves in charge go over to the nursery beds both morning and evening, watering any of which the surface has become dry, the practice being to sprinkle water with the hand from the water jar. The process may be summarized as follows: As long as the seedling is not thoroughly developed, every day; when the plants are above ground, every other day; when 6 inches high, once a week or ten days. The plants are kept, on an average, from nine months to one year in shaded beds. When the plants are about 6 inches high they are by degrees hardened by the thatch of the framework being gradually removed, and they are then left in the open beds freely exposed to sunshine for the space of one month or two months before planting out.

*Planting Out.*—Special care is taken in planting out. The earth round the plant is loosened by a peculiar triangular-shaped spade used especially on clove plantations, and called "moaa," and in use in Zanzibar, as well as the ordinary native "jembe," or hoe, already referred to. The plant is then carefully lifted out by the hand with as much earth adhering to the roots as possible, and placed upon two strips of banana fibre previously placed cross-wise upon the ground. (Each strip of fibre is about 3 inches to 4 inches wide, by 1½ feet to 2 feet in length.) The four ends are then taken up and wrapped round the plant and firmly tied together. The plant is



then carried to its destination, the strips of fibre effectually keeping the earth in position. Before planting, the pieces of fibre passing beneath are cut at each corner, and the plant finally placed in the hole prepared for it and the earth heaped round; the four ends of the fibre left at the sides are then removed one by one, the bottom portion being cut through, enabling this to be done with ease.

*After Treatment.*—If the weather is hot, or in the event of drought, the young plant is watered in the evening daily, and watering is continued as required until the plant attains the height of 18 inches, or, roughly speaking, during the space of one year. The young plants are not shaded in any way after planting. There appears to be great mortality amongst young plants, and a good deal of supplying is required, and a nursery is deemed indispensable for five years after a plantation is first opened up. (Probably were the plants shaded until established, their level raised, and less frequently watered, and better hardened before planting out, this excessive mortality would be checked.) No ground or other cultivation is permitted amongst the cloves, but slaves everywhere appear free to cultivate their own plots and gardens amongst the trees, and I also observed cassava growing in a clearing of young clove trees; and the general run of small “shambas” consists of cloves, cocoanuts, mangoes and other fruit trees, all planted indiscriminately, and close together. No pruning whatever appears to be done. No manuring either, apart from fallen leaves, and this in the more favored localities where the rows of clove trees shade the ground must add greatly to the fertility of the soil, the accumulation of leaves being considerable, and the flat nature of the ground preventing wash.

*Age of Trees.*—There are some trees now growing on the island which are said to be nearly 90 years of age, but the average length of life of the clove tree in Zanzibar appears to be from 60 years to 70 years, and I have this on the authority of Mahomed-bin-Saif Drumiki, an elderly Arab of much experience, and who has been for over 20 years in charge of the Sultan's plantation at “Indo.” Such terrible devastation resulted from the great hurricane of 1872, when nearly all the clove plantations on the island were destroyed, that the average age of the trees now growing may be put down as below 20 years, and the age of the trees in the Sultan's plantation, the largest in the island, is from 16 years to 17 years. The appear-



ance of the clove plantation is, as a rule, most healthy and luxuriant, the height of the more matured trees averaging fully 40 feet, and the branches of the two rows often completely shading the ground. Clove trees generally have forked stems, and often as many as three and four, and a single boled tree is the exception.

*Enemies.*—So far as I have been able to ascertain, and I have made careful inquiries on this subject, the clove tree is not subject to any fungoid disease, and the percentage of dead, dying and unhealthy trees noticed by me was very small. The cause generally was either a damp situation, or else want of cultivation, and the presence of grasses, especially "hook," called in Swahili "Pamba ya moitu." The clove tree, however, suffers from the attacks of two enemies: One a caterpillar, which attacks the foliage in the dry weather and often denudes the tree of its leaves, but the tree recovers at once as soon as the rain sets in. The other is the white ant, which occasionally attacks the roots. No remedial measures appear to be taken.

*Collection.*—Clove trees begin to yield, in good situations, 5 years from planting; in inferior soil, 6 years to  $6\frac{1}{2}$  years from planting. Cocoanut trees are generally planted at irregular distances between the rows of clove trees, but the reason for doing so appears to be quite forgotten, the usual reply being that "it was the custom." (Cocoanut trees are usually planted here and there amongst the clove trees in Amboyna and the Moluccas, it being believed that the proximity of this tree is beneficial to the clove. The French most probably adopted the custom in Mauritius and Réunion, and it eventually found its way to Zanzibar.) The picking of the buds commences in August and lasts for four months, and on an average each tree is picked three times in a season. The unexpanded buds on the trees are at first a pinkish yellow, becoming a deeper red as they mature. The stalks and buds are gathered at the same time, and thrown on to grass mats spread on the ground; the picking of the higher branches is done by means of triangular bamboo ladders. Other slaves pick off the buds from the stalks, and they are then spread out to dry in the sun, being taken in every night.

*Drying.*—The cloves are dried on mats in direct sunlight. The drying is continued for the space of 6 days or one week. Green cloves dry down to about half their weight; thus 1 frasila,<sup>1</sup> green,

<sup>1</sup> 1 frasila = 35 lbs.

is equal to  $\frac{1}{2}$  frasila, dry. The color desired in the dry clove is red; and buds of this color are more valued than black. Cloves are dispatched to Zanzibar in gunny bags. There is a duty due to Government of 25 per cent.; this is paid in kind, and the cloves heaped in bulk in the Government godowns. Public auctions of this are now held by Government every fortnight to allow open competition, and especially to admit European merchants. Zanzibar cloves are very dry, differing much in this respect from the Pemba produce, and can be stored for some time, but Pemas are disposed of as early as possible, as otherwise the loss from "shortage" is very great. The latter generally arrive damp, and there is much shortage when dried. A good dry sample of Pemba cloves is smaller and blacker—blacker from having contained much moisture. Zanzibar cloves are larger, the red appearance of the dried buds is unmistakable, and they are well-known as "Zanzibar red-heads."

*Export.*—Cloves are generally exported in double mat bags ("makanda") in preference to gunnies, though there is more shortage—in fact, the difference is marked; though double, the mat bags apparently permit a greater absorption of damp. The difference of shortage between Zanzibar and Europe in the weight of the cloves equals 8 per cent. The difference between Zanzibar and Pemba cloves is well recognized in Europe, but large shipments of both varieties are also made to Bombay, where they are very probably mixed. Also large exports of clove stalks are made to both Bombay and New York. The exports of cloves from Zanzibar for 1890-91 are as below:

	1890. Frasilas.	1891. Frasilas.
Zanzibar, . . . . .	124,929	62,017
Pemba, . . . . .	385,981	326,986

## GENERAL METHOD OF CHEMICAL SYNTHESIS.<sup>1</sup>

BY R. PICTET.

According to the theory which the author holds, all chemical action should be impossible at very low temperatures, and a series of very interesting experiments has been executed in order to show that this is the case. Aqueous sulphuric acid, containing 89

<sup>1</sup> *Compt. rend.*, **115**, 708-712, and 814-817; *Jour. Chem. Soc., Abstr.*, 1893, ii, 112.

per cent.  $\text{H}_2\text{SO}_4$  and solidifying at  $-56^\circ$ , was brought when in the solid condition and at  $-125^\circ$  into intimate contact with finely powdered sodium hydroxide, also at  $-125^\circ$ , and the two strongly compressed without any sign of chemical change occurring. The passage of electric sparks through the mass only causes action to take place in the path of the sparks, but this action is not communicated to the rest of the mixture. On warming, action suddenly commences at  $-80^\circ$ , the heat evolved and abrupt change of temperature causing breakage of the vessel containing the mixture. With sulphuric acid containing 35 per cent.  $\text{H}_2\text{SO}_4$  and solidifying at  $-88^\circ$ , similar results were obtained. Potassium hydroxide employed in place of sodium hydroxide remains in like manner unacted on below  $-90^\circ$ . Concentrated ammonia and sulphuric acid do not act at all on one another below  $-80^\circ$ ; above this temperature, a limited action takes place under the action of electric sparks, and at  $-60^\circ$  to  $-65^\circ$  complete action suddenly occurs. Sulphuric acid and common salt do not react below  $-50^\circ$ ; from  $-50^\circ$  to  $-25^\circ$  there is a limited action, and then complete action occurs. With the carbonates of calcium and sodium and 35 per cent.  $\text{H}_2\text{SO}_4$ , there is no action at  $-80^\circ$ . The first bubbles of gas make their appearance at  $-56^\circ$  with sodium carbonate, and at  $-52^\circ$  with calcium carbonate, and the reaction becomes turbulent at  $-15^\circ$  with calcium, and at  $-30^\circ$  with sodium carbonate. All other carbonates behave similarly. With nitric acid in place of sulphuric acid, similar results were obtained in all the above cases, chemical action commencing, however, at a slightly lower temperature in each case. Metallic sodium, when brought into contact with aqueous alcohol, containing 84 per cent. alcohol, at  $-78^\circ$ , undergoes no change. Action only commences at  $-48^\circ$ , and then proceeds briskly. Sodium and 35 per cent.  $\text{H}_2\text{SO}_4$  may be mixed at  $-85^\circ$  without any action occurring, but, when heated up to  $-50^\circ$ , a violent action suddenly commences, the hydrogen evolved inflaming spontaneously. Metallic potassium acts in a similar manner, but in this case change sets in at  $-68^\circ$  instead of  $-50^\circ$ . If sulphuric acid and an alcoholic solution of barium chloride are mixed at  $-85^\circ$ , no change occurs, a precipitate first appearing when the solution is heated to  $-70^\circ$ . At  $-40^\circ$  the reaction is complete. Alcoholic silver nitrate and hydrochloric acid were mixed at  $-125^\circ$  without reaction. At  $-90^\circ$  action commenced, and was



complete at  $-80^{\circ}$ . Potassium hydroxide in alcoholic solution and phenolphthaleïn were mixed at  $-135^{\circ}$  without any change occurring; a faint red tinge appeared at  $-100^{\circ}$ , and the color was pronounced at  $-80^{\circ}$ . Litmus in contact with sulphuric and hydrochloric acids remains blue at  $-120^{\circ}$ , a sudden change to red taking place in the one case at  $-105^{\circ}$ , and in the other at  $-110^{\circ}$ .

As general results of these observations, the author concludes that no action whatever takes place between the temperatures  $-125^{\circ}$  and  $-155^{\circ}$ , no matter what the nature of the reacting substances.

## MINUTES OF THE PHARMACEUTICAL MEETING.

MAY 16, 1893.

On motion, Mr. Wm. McIntyre was called to the chair. The minutes of the last meeting were read, and no corrections being called for, they were approved.

The following report was read:

The committee on Pharmaceutical Meetings would respectfully submit the following report:

The meetings have been held each month from October, 1892, to May, 1893, inclusive, and the increased attendance and interest manifested have been marked. A feature introduced during this series has been an occasional short address upon subjects interesting to pharmacists; the most notable being those of Prof. Remington on acetic acid as a menstruum; Prof. Sadtler on sodium peroxide, and Dr. J. D. McFerran on compressed tablets. One of the most interesting was the address of Mr. Jos. R. Wilson when exhibiting the "Shaw Gas Tester and Inspector machine." While not applicable to pharmacy this application of the principles of chemical phenomena and the mechanical ingenuity of the machine and its accurate working proved a subject of great interest to the audience.

Manufacturers are recognizing the value of the meetings as a means of introducing to the members of the drug trade new products, apparatus and machinery, and no doubt this will prove a valuable feature of our meetings in the future.

Under the title of verbal communications numerous observations, formulas, suggestions, queries and prescription difficulties have been reported. While in the published report of the proceedings these make but little showing, their practical importance to the pharmacist is incalculable and they have done much to increase the popularity of these meetings.

Twelve papers read before these meetings have been published in the American Journal of Pharmacy, and in addition they have elicited several editorial comments and articles.

While the number of papers read has not been as large as in several years past, this is but in sympathy with the present prevailing ebb in the tide of pharmaceutical literature to which attention has already been directed by



the editor. And it is a source of congratulation that in spite of this and the interruption arising from the building operations of the College, original papers have been presented at nearly every meeting. Our Pharmaceutical Meetings continue to be an index of the advance in pharmacy.

It is a matter of regret to the committee that the circle of contributors is not more extended, and they would take this opportunity of again impressing upon each graduate of our College that our *Alma Mater* expects and invites them to participate in her institutions. The pharmaceutical meetings and the American Journal of Pharmacy are two of her oldest and most valuable institutions.

Contribute here your observations, experiments and difficulties. Write to any member of the committee.

GEORGE M. BERINGER,  
 J. W. ENGLAND,  
 HENRY TRIMBLE,  
 CLEMENT B. LOWE,  
 WILLIAM MCINTYRE.

The report was accepted, and F. X. Moerk moved a vote of thanks to the committee for the efficient manner in which they have discharged their duties. This was unanimously passed and the committee discharged.

A paper upon a *proximate principle of phytolacca* was read by Prof. Trimble. Prof. Maisch thought that this principle was apparently purer than others which had been previously isolated as the active principle of poke root; but that physiological experiments were needed to ascertain its claim to that distinction. Modern researches, largely carried on under the supervision of Professor Kobert, had shown that many of the saponin-like compounds, as formerly prepared, could be separated into two or three distinct principles, differing in their poisonous properties and in their power of destroying the red blood corpuscles.

A paper upon the *comparative value of different brands of hydrogen peroxide*, by Richard L. Lloyd, was read by Mr. Moerk. Referring to the term *fresh* used in the paper, Professor Maisch thought that it was applied in a commercial sense, meaning recently procured in the market; also that a solution of hydrogen peroxide was so prone to decomposition according to its concentration, and under the influence of temperature, contact with certain bodies and other conditions that many manufacturers declined preparing it on a large scale of a guaranteed strength. Dr. Squibb preferred to furnish the carefully adjusted materials for preparing the solution as needed, giving minute directions to insure success. Mr. Moerk stated that a neutral solution is less permanent than one slightly acid; but that it is certainly a mistake for manufacturers to state on their labels that it is entirely permanent.

Dr. C. B. Lowe exhibited specimens of *Sepia officinalis*, the male and female cuttlefish, procured from the eastern Mediterranean, and gave some account of the habits and uses of this cephalopod.

Professor Maisch called attention to the fact that the so-called feet of cephalopods were tentacles used by the animals for various purposes, and that their construction was peculiar. The size attained by different species of cephalopods was also alluded to.

Dr. Lowe also called attention to *Webb's ice shaver and crusher* as being a very successful and convenient device offered in the market for this purpose.

A very simple and effective device for *fastening the corks* of bottles containing effervescent drink and liquids consists of a small tin disc slightly concave, pierced with two holes through which flexible-tinned wires are passed. The convex side is placed against the neck of the bottle and the wires passed to the other side of the neck, where they are twisted; after the cork is driven into its place, the wire is passed over the cork and a turn around the disc is taken and the ends twisted together forming a firm "tie" over the cork. Their moderate price, and the fact that they are generally left attached in good condition to the bottle returned for repetition, makes them a very desirable method of securing corks.

W. L. Cliffe, Ph.G., exhibited samples of *rubber-coated corks*, having the advantage of the rubber cork, but being very much cheaper; they have been used for iodine, acids and alkaline liquids quite successfully.

Prof. Maisch exhibited a plant, *Scopola carniolica*, a native of Austria, which he had raised from a living rhizome, received from Parke, Davis & Co. through Mr. Naglevoort, of Detroit. The rhizome had survived the last severe winter in the open air, and produced its first flowers in the first half of April; he also called attention to its botanical characters and its chemical constituents as determined during recent years.

A flowering branch of *Magnolia grandiflora*, sent him from Florida, was exhibited by Prof. Maisch, who explained why this handsome tree, according to strict rules, recently adopted by botanists, is now sometimes called *Mag. fetida*, a name it by no means deserves, as there is nothing like fetor in its odor.

Professor Maisch made inquiry whether any one present had recently examined jalap root for the yield of resin; the pharmacopœia of 1880 required it to contain 12 per cent., but it had often contained much less resin. Recently, however, a much better quality of jalap had been met with, and specimens received from New York and Detroit had assayed from 16 to over 20 per cent. of resin. It seemed strange that no attempt had yet been made to cultivate the plant in this country, while it was a matter of record that the roots would survive our winters and those of central Europe. He hoped to get roots from Mexico for the purpose of experimentation.

Prof. Maisch called attention to two *samples of water*, received from the Buffalo Pure Water Co.; from the label it was learned that the water recommended for drinking purposes was a water twice distilled with much care, and subsequently aerated; this was stated to be used to prepare the *lithia water* that constituted the other sample and appears to be a solution of lithium carbonate in such water. The same water is also used in the preparation of other artificial mineral waters, for which pure water alone should be employed.

A prescription calling for *emulsion of terralin* was read, and it was stated that *terralin* is a proprietary article of the nature of soft paraffin, and put upon the market from Washington, D. C. One part of acacia to 2 parts of this substance having yielded a pasty emulsion, it was suggested that a small quantity of tincture of soap bark would be useful in emulsifying, or probably a little gelatin would aid in keeping the substance in suspension.

*Thyroid*, made by Parke, Davis & Co., was exhibited; it is claimed to be of equal efficacy with the fresh thyroid gland of the sheep, and is recommended in myxœdema.

Two specimens of dilute *hydrocyanic acid* were exhibited, one of which had been repeatedly opened and remained unchanged in appearance, while the other, prepared at the same time, and kept in a glass stoppered bottle wrapped in dark colored paper, had become quite black; a change attributed to the formation of paracyanogen.

At a recent meeting Mr. Ross had exhibited some crystals which he found in a specimen of *extract of stramonium*; examination showed them to be *chloride of potassium*.

Professor Trimble exhibited a plant, *Impatiens Balsamina*, which had been germinated in washed saw-dust, and it was then transferred to a bottle containing *nutritive solution*, and was now in full bloom. Several plant foods, recommended in botanical works, were tried and proved less satisfactory than the one made by the following formula:

Potassium nitrate, . . . . .	0.500 gram.
Calcium nitrate, . . . . .	0.500 "
Sodium phosphate, crystals, . . . . .	0.250 "
Potassium chloride, . . . . .	0.250 "
Magnesium sulphate, crystals, . . . . .	0.250 "
Ferrous sulphate, crystals, . . . . .	0.005 "
Distilled water, . . . . .	1,000 cc.

The salts are separately dissolved each in 166 cc. of water, and the sodium phosphate solution is added last to the mixture.

*Glycerite of zinc* having been prescribed, the physician who ordered it gave the formula as follows: Pure oxide of zinc, ʒss; glycerin, ʒiij.

The Chairman announced the committee for the next series of meetings to be Prof. H. Trimble, Chairman; Dr. C. B. Lowe, J. W. England, Wallace Procter and W. L. Cliffe.

On motion, adjourned.

T. S. WIEGAND, *Registrar*.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*Manual of Chemistry*.—A guide to lectures and laboratory work for beginners in chemistry. A text-book specially adapted for students of medicine and pharmacy. By W. Simon, Ph.D., M.D., Professor of Chemistry and Toxicology in the College of Physicians and Surgeons, Professor of Chemistry and Analytical Chemistry in the Maryland College of Pharmacy, Baltimore. Fourth edition, thoroughly revised. Philadelphia: Lea Bros. & Co. 1893. 8vo. Pp. 493. Price, cloth, \$3.25.

This valuable work, upon which we have commented when it first made its appearance in 1884, and since then, is now before us in its fourth edition, and remains unchanged in its eminently practical scope and in its judicious arrangement, but has been somewhat modified in certain details, and carefully revised so as to make it, if possible, even more adapted to the wants of the medical and pharmaceutical student than heretofore. Considering the rapid advances made in chemistry as applied to medicine and pharmacy, the addition of new matter was absolutely necessary; and this has been done in such a way as not to change the character of the work, which is that of a guide to beginners in



chemistry, with special reference to students of pharmacy and medicine. We are glad to observe that a special feature of this manual, to which we called attention nine years ago, has met with general favor, and has been retained in the edition before us. We refer to the plates showing 56 representations of the exact colors or change of colors of characteristic reactions, which are appreciated not only by the tyro. Mainly because in the new United States Pharmacopœia the system of orthography and nomenclature of chemical compounds recently proposed (see April number, p. 179), has not been adopted, the author also adheres to the system thus far in use, it being considered unwise to have the student confronted by two different systems of orthography. There is much force in this argument, as we know from personal experience; for though we have advocated some of these changes years ago, we have been using them in print only to a very limited extent, for reasons similar to the one stated. Yet an effort should be made for the general adoption of the rules by journals and text-books; uncertainties, which might be arising from the perfectly proper conservative course pursued by the Pharmacopœia and similar works, would then easily be set aright.

*Missouri Botanical Garden*.—Fourth annual Report. St. Louis, Mo.: published by the Board of Trustees. 1893. 8vo. Pp. 226 and 23 plates.

The handsome volume contains various reports, addresses, etc., relating to Shaw's garden, and two valuable scientific papers, one of which on *Yucca*, by Professor Trelease, was noticed on p. 206 of our April number. The other paper is a list of plants collected in the Bahamas, Jamaica and Grand Cayman, by Professor A. L. Hitchcock. Seven of the Bahama Islands were visited, and four parts of Jamaica. The total number of species determined is 953, to which are to be added the varieties and the cultivated species. The list gives the localities of collection, and is accompanied by remarks on nomenclature and on the relation of the flora of the Bahamas; also by a tabular exhibition of the plants collected, showing their distribution in the islands visited, and in other localities of the western hemisphere. A full index of genera, including the synonyms renders the list very available for reference.

*J. L. Soubeiran*, décède le 15 décembre, 1892. Montpellier. 8vo. Pp. 20.

The pamphlet contains the discourses pronounced in the école de pharmacie on the occasion of the funeral services; also a list of the publications by the deceased savant, the titles of the essays and books occupying nine pages in print.

*Promenades et Excursions botaniques faites en 1891 dans les environs de Besançon, le Doubs et les Vosges*. Compte-rendu par Ménelik. Besançon. 1893. Pp. 35.

These botanical excursions, undertaken under the guidance of Professor Dr. A. Magnin, of the Besançon School of Medicine and Pharmacy, are quite entertainingly and humorously described by the author; as far as the plants collected are concerned, the names of the more interesting or rarer species only are given.

*Experiments with Sugar Beets in 1892*. By Harvey W. Wiley, chemist of the U. S. Department of Agriculture and Director of the Department Sugar Experiment Stations, at Schuyler, Nebr., Runnymede, Fla., and Sterling and Medicine Lodge, Kan. Washington. 1893. Pp. 74.



*Record of Experiments with Sorghum in 1892.* By Harvey W. Wiley. Pp. 100.

These two pamphlets are Bulletins 36 and 37 of the U. S. Department of Agriculture, Division of Chemistry, and have been prepared, the former with the collaboration of Dr. W. Maxwell, and the latter with the assistance of Messrs. A. A. Benton, G. O'Brien, W. J. Thompson, J. L. Fuelling and O. Carr.

*The addresses at the inauguration of Chas. Kendall Adams, LL.D., to the presidency of the University of Wisconsin, January 17, 1893.* Madison. Pp. 69.

That on an occasion, as indicated on the title page, the addresses should be on the subject of education and educational institutions in their various relations, is self-evident; they will be read with much interest.

*Psychopathia Sexualis, with Especial Reference to Contrary Sexual Instinct. A Medico-Legal Study.* By Dr. R. von Krafft-Ebing, Professor of Psychiatry and Neurology, University of Vienna. Authorized translation of the seventh enlarged and revised German edition. By Charles Gilbert Chaddock, M.D., Professor of Nervous Mental Diseases, Marion-Sims College of Medicine, St. Louis, etc. Philadelphia. The F. A. Davis Company, Publishers. 1893. 8vo. Pp. 436. Price, cloth, \$3; sheep, \$4.

The author states in the preface that the purpose of his treatise is a description of the pathological manifestations of the sexual life and an attempt to refer them to their underlying conditions. The task is a difficult one, and, in spite of years of experience as an alienist and medical jurist, the author is well aware that what he can offer must be incomplete. Yet, the importance of the subject for the welfare of society, especially forensically, demands that it should be examined scientifically. This the author has faithfully done. His work is divided into four parts, treating respectively of psychology of the sexual life, physiology, general pathology and special pathology, each part being comprehensive, and in its details as well as in its generalizations, showing the earnest search after the fundamental facts, so as to gain an insight into cause and effect. A noted physician has said that the terminal forms of sexual aberrations end in asylums for the insane, but the doubtful cases in which completeness of development or apparent viciousness render correct diagnosis difficult, make up the majority. This it seems to us states the necessity for such a work in a few words; it is intended for the physician as well as for the jurist. The translation has been well done, and the intentions of the author are clearly presented in the English version. The book is sold only by subscription.

*Contribution à l'étude des lactoses.* Par Georges Denigés, docteur es sciences physiques, etc. Bordeaux. Pp. 69.

This contribution to the study of the lactoses is a thesis presented to the Paris School of Pharmacy for obtaining the diploma of pharmacist of the first class. The author has studied the sugar contained in six different milks, that of woman, cow, goat, ewe, ass and mare, and has shown the chemical identity of these sugars. The milk sugar contained in the extract obtained by evaporation at 100° C. was found to be anhydrous. The properties of the sugar and of the serum have been investigated and compared; and in the latter two different substances were found, which are freely soluble in water, not precipitated by

reagents for albuminoids, and destitute of reducing power; one having a dextrogyre rotation was met with in mare's and ass' milk; the other, lævogyre, in woman's milk. These new compounds are being further investigated.

*Pharmaceutical Society of Australasia*, with which is incorporated the Pharmaceutical Society of Victoria, Melbourne.

The 36th annual report gives a brief account of the transactions of the Council and of the Society, with lists of members, honorary members, etc.

*Annual Address before the State Board of Health of Pennsylvania*, by S. G. Dixon, M.D., Professor of Hygiene in the University of Pennsylvania. Pp. 15.

The address treats of tuberculosis and its prevention.

*A monograph on Cascara Sagrada*. A condensed compilation of the most recent and valuable literature on this important drug. Detroit: F. Stearns & Co. Pp. 17.

This little pamphlet treats briefly of the botanical and chemical history of the drug named, and gives more in detail, a considerable number of abstracts referring to the medical action and therapeutic uses of this valuable bark. A copy of the pamphlet will be mailed to those interested upon application to the publisher.

## OBITUARY.

*Daniel Sexton Jones*, Ph.G., class 1843, died at his residence May 12. He was born near Columbus, O., November 13, 1822, was educated at a boarding school, at Burlington, N. J., and served his apprenticeship in pharmacy with Henry Zollickoffer, Sixth and Pine Streets, Philadelphia. His graduating thesis on *Arum triphyllum*, was published in this journal in 1843. In 1846 he began business for himself at 1201 Spruce Street, where he continued until his death. He became a member of the Philadelphia College of Pharmacy in 1845, and took an active part in its welfare, participating in former years in the pharmaceutical meetings, and serving the College frequently on committees and for many years as a member of the Board of Trustees. His widow and a daughter survive him.

*Albert F. Stifel*, Ph.G., class 1873, died in his native city, Wheeling, W. Va., April 10, after a lingering illness, caused by a tumor on the optic nerve. He was born July 22, 1855, learned the drug business in Wheeling and in Philadelphia, and after graduating in this city, clerked in New York, until he went to Germany to study medicine at Würzburg and Leipzig, graduating from the latter university in 1879, and subsequently spending six months in the hospitals at Vienna. At Wheeling, where he settled after his return, he soon secured a lucrative practice, and was selected to fill a number of responsible and honorable positions. He leaves a widow and 3 children.

*Edmund Francis Bocking*, a member of the last senior class, died in this city, April 2, of inflammation of the brain; the body was taken to his former home at Wheeling.

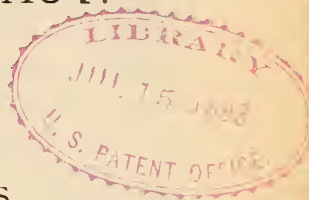
*Frederick Henry Pashley* also a senior student, died at his home, Bridgeport, N. J., March 24, of consumption.

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## INSECTS INJURIOUS TO DRUGS.

BY PROFESSOR L. E. SAYRE.

A knowledge of entomology to the average pharmacist has always been considered of little more value than an ornamental accomplishment, having little more application than the scientific classification and naming of the few drugs derived from the insect world. To give these proper entomological names and understand in some degree their relations to other insects and the relations of the groups to which they belong to other groups has been all that was deemed necessary for the pharmacist to know of this department of scientific study.

It needs little argument to prove that a more intimate study of insects is not only useful but is almost as essential to those who are supposed to discover the cause of deterioration and to be able to combat the same intelligently. This knowledge should extend to the insect forms which infest and feed upon drugs and their preparations, as the mites and dermestid beetles and forms which prey upon the drug-eating species. This, it may be said, embraces a very limited range in the eyes of the entomologist, but an acquaintanceship with this much of the science should be, for very practical purposes, well understood.

It is not my purpose in the subjoined article to treat of the science, *per se*, or to go into any lengthy detail as to the study of drug-eating insects as has been carried on in the entomological department of the University of Kansas. An article by Prof. V. L. Kellogg and myself, describing the work of last year, will be found in the Proceedings of the Kansas Pharmaceutical Association for 1892. Since

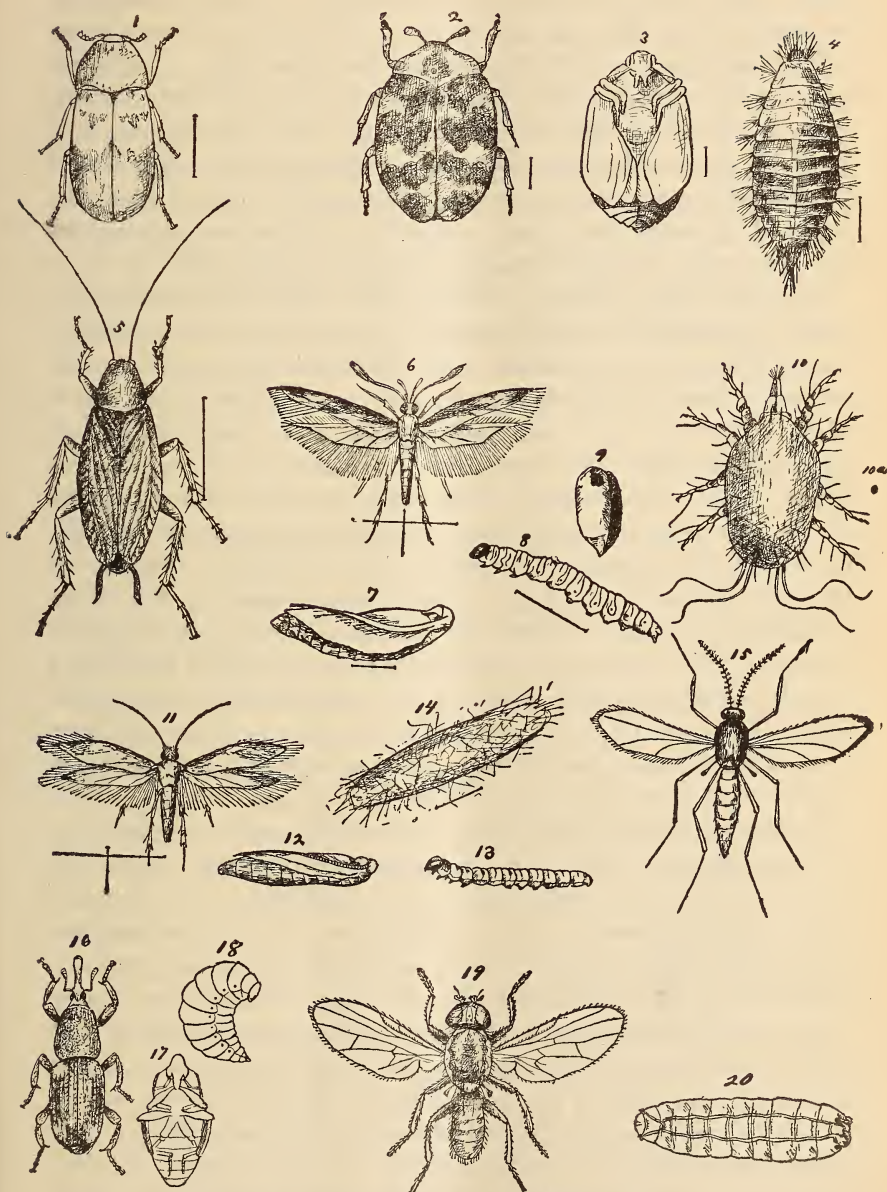


this time, Prof. Kellogg and Mr. S. J. Hunter have continued this study, to whom I am indebted for the material contributed upon the subject at the last meeting of this Association. I shall in this article briefly glance at the various insects themselves found in various drugs and make some comments upon them for the better understanding of them.

Referring now to *Plate I*, I will call attention to *Fig. 10*. The natural size of this *mite* is found in *Fig. 10a*. This is the common cheese, or flour mite, familiar to most of us, found in farinaceous drugs. The order to which it belongs—the mites—are characterized by having most of the mouth parts united to form a piercing beak. They have two sharp needle-like projections which correspond to the jaws or mandibles of other insects. These stylets or lancets are very useful when the mite needs to pierce some protecting envelope to get at succulent inner matter, or when the mite has to live on “dry food.” This mite species lives on raw sugars, in which it appears as small white specks. At least a half dozen species of mites attack cantharids, which, we know, are insects belonging to the great beetle order. Besides the mites, several species of small animal eating beetles do great havoc in the jars of cantharids. The beetles of the dermestid family, to which belongs the well-known buffalo bug, or moth of the household, feed almost exclusively on the dried remains of animals; at least this is their food when in the young or grub state. Right here it may be well to interpose a few remarks upon certain peculiarities in the life history of insects, the knowledge of which is essential to the intelligent comprehension of the subject in hand.

While in certain groups of insects the young when hatched from the egg (and insects are hatched from eggs, almost without exception) resemble the parents, the adults, yet, in other groups or orders, as the beetles, the two-winged flies, the butterflies and moths, and the ants, bees and wasps, the young appear in wholly different form from that which they will assume when full grown. For example, in the beetles, you remember, we had come to the consideration of certain cantharid-eating beetles, the first stage after leaving the egg is that of a grub or worm, so-called. This worm-like stage is called the *larval* stage, and the insect itself a *larva*. In the case of the dermestid beetles, of which several kinds infest the cantharids, the larva is a peculiarly hairy grub, well shown in the accompanying





*Insects Injurious to Drugs.*

plate. The dermestid beetle here illustrated in its various stages of growth is the buffalo bug, and in *Fig. 4* is the "fish"-shaped larva with its hairy body, next the mummy-like pupa (*Fig. 3*), with its legs and feelers closely folded against its body. This is the second stage in the life of the beetle. After the larva has become full grown, it seeks a sheltered spot, ceases feeding, and becomes transformed into an almost immovable mummy-like object, called the pupa. It remains thus quiet and without eating for a few weeks (in most cases), and then emerges, the perfect beetle (*Fig. 2*).

There are other species of beetle which attack the pharmacist's stores; for example, *Ptinus brunneus* (we are sorry to be compelled to use these scientific names, but very few insects have common names), a small brown, slender legged beetle, which feigns death when disturbed, does great havoc in the larval stage, in jars of all-spice, capsicum and cinnamon. *Anobium paniceum*, one of the so-called "death ticks" and much like the *Ptinus*, attacks agaric and several other drugs. *Lasioderma serricorne*, closely related to the *Anobium* and *Ptinus* (all belonging to the family *Ptinidæ*), eats, as larva, capsicum and dried tobacco. *Bostrichus dactilliperda*, another member of the same family, attacks sweet almonds. Two species of *Ceutorhynchus*, small, snouted beetles or weevils, infest poppy and other seeds. Another weevil, *Dalandria oryza* (*Figs. 16, 17, 18*), imported from Europe, infests rice and ground roasted acorns. A near relative is the notorious grain weevil, which does great damage to stored cereals.

Leaving the beetles now, the next group of insects important to the pharmacist is that of the moths and butterflies. While we should hardly expect to find moths and butterflies with their long nectar-sucking tubes for mouths, injuring our stores, we do find that these same insects in their young or larval stage, when they are familiar to all as "caterpillars," do not a little injury to our drugs.

The moths, like beetles, go through a strange metamorphosis, and while in the caterpillar stage are provided with strong jaws for eating dry food. All know of the clothes-moth, dread foe of the housewife, which, as a small white caterpillar, living in a cylindrical roll or case made from the woollen cloth or fur it is feeding on, does irreparable injury to the choicest fabrics and costliest furs. This moth belongs to the genus *Tinea*, of which one or more species attack drugs. *Figs. 11, 12, 13, 14* illustrate the life history of the

moth of this genus. *Fig. 13* is the larva or caterpillar, *Fig. 14* the case or roll in which it lives; *Fig. 12* is the pupa or resting stage, and *Fig. 11* is the adult moth. The moth is very small and light brown in color. Another moth, known as the Angoumois grain moth (it does great havoc to stored grain in the province of Angoumois, France; hence the name), attacks in the caterpillar stage all kinds of stored grain. It bores holes into the grain kernels and eats out the starchy interior, leaving only a delusive hollow shell. The illustrations *Figs. 6, 7, 8, 9*, show its various stages and the appearance of the infested grain kernels. The larva of *Carpocapsa amflana*, a moth of the same genus as the codlin moth, the greatest insect pest of the apple, infests the seeds of *Corylus avellana*, *Juglans regia* and *Castanea vesca*. The larva of *Myelois ceratoma* feasts on the fruits of *Ceratoma siliqua* and *Castanea vesca*. The larva of the moth *Ecophaga oliviella* inhabits the kernels of the olive, causing the dropping of the fruit and a smaller yield of oil.

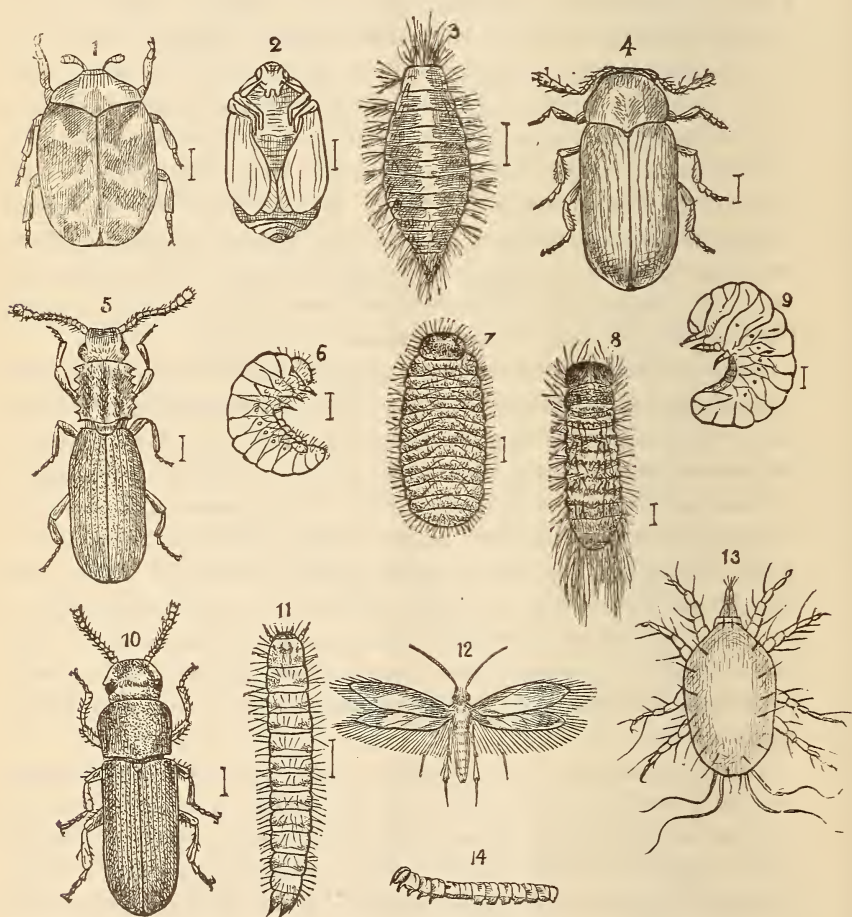
Passing now to another order of insects, the two-winged flies, we find that while the mouth parts of the adult flies are adapted for sucking or lapping, the young flies, which appear as grubs or maggots, are better prepared to partake of solid food. The olive in southern France and Italy is infested by a larva of a fly known as *Dacus oleæ*; in the kernels of fresh hazel nuts are often found the larvæ of a fly which belongs to the same genus as that notorious wheat pest, the Hessian fly (see *Fig. 15*). The fly *Trypeta arnicivora* (see *Figs. 19* and *20*, illustrating a nearly allied species, *pomonella*) is often gathered in its youthful state with arnica flowers and becomes developed later on, after feeding on the flowers in the pharmacist's canisters.

About two months ago I placed a notice in the leading pharmaceutical journals of the United States, in which I asked that any insects found destroying drugs should be sent to me in order that they might be studied. As a result, several packages of drugs damaged by insects have been received from different parts of the country, giving an excellent opportunity to pursue the study further. As a result of this latter work I will refer to *Plate II*.

From P. R. Brooks, of Miles Grove, Pa., was received pressed packages of peppermint, marshmallow leaves, skull cap, wormwood and thorn apple. All of these drugs were infested by a small brown beetle 5 to 7 mm. in length, 2 mm. in width, with longitudinal rows



of punctures on wing covers, body above and below covered with fine hairs. This insect is known as *Nicobium hirtum* (see Figs. 4 and 9 for adult and larva). When the insect is disturbed, it feigns death,<sup>2</sup> but soon resumes activity and seeks a hiding place. This



insect, as far as we have been able to observe, is one of the worst of insect drug pests. A small box of pulverized capsicum from D. S. Morgan, Jersey City, also one from J. M. Foy, Worcester, Mass., contained both the adult and larvæ of this brown beetle. Upon examining some drugs in stock in the University's Depart-



ment of Pharmacy, we found this insect in some roots of a bitter character; also, in orris root and ginger root. It is not improbable that this insect may be found attacking any drug containing starch. From Michigan (name of firm and place of residence not given) a package of caraway was received containing the larvæ of some beetles. This larva measures about 7 mm. in length, is white, with pale brown head and body partly covered with short brown hairs (see *Fig. 7*).

From C. L. Becker & Co., Ottawa, Kan., three packages of drugs injured by insects were received. One of them was a small package of foenugreek, in which was an insect very closely allied to one familiar to housewives of Eastern States, the notorious "buffalo bug." *Figs. 1, 2* and *3* show the adult, pupa and larva states, respectively, of this drug pest. It is *Anthrenus varius*.

Its color is black and white; sometimes the white is tinged with reddish yellow. The adult insect lives chiefly on the pollen of certain plants, such as the different varieties of spiræa and those of the shad-bush, *Amelanchier canadensis*. Indoors it not only attacks carpets, rugs and woollen goods, but also collections of natural history, furs, hair and drugs. The larva is more destructive than the adult insect.

The second was a small box of Indian turnip. The drug came all right, but the insects had cut a hole through the side of the box and escaped. The third lot was a package of condition powders containing the brown insect, *Nicobium hirtum*, just described.

A box of pulverized marshmallow was sent from Philadelphia. In it were a number of small brown beetles. They were 11 mm. long and 2 mm. wide. The long, white larvæ was in the same box, and these are shown in *Figs. 10* and *11*.

M. Noll, Atchison, Kan., sent an extract of licorice infected with some small white beetle larvæ which is shown in *Fig. 6*. From the same firm came a box of almond meal in which were a lot of dark brown beetles, *Silvanus surinamensis*. This beetle is shown in *Fig. 5*, and is easily recognized by the serrated edges of the portion between the head and wings. Its long, narrow body and antennæ enlarged at the tips. *Figs. 12* and *14* represent two phases in the life of a moth of the genus *Tinea*, frequently found flying about among drugs. *Fig. 13* shows a little white mite, highly magnified, and seen as small specks on cantharides kept in stock.

So far, only insects attacking drugs proper have been mentioned, but in our investigations we have met some insects that destroy articles not properly called drugs, but always kept in drug stores. For instance, the larva represented in *Fig. 8* is that of a beetle which lays its eggs on bone combs. The grub, on hatching, bores its way back and forth through the substance of the comb until the comb is made absolutely worthless. Another beetle attacks horn combs, either breaking off the tips of the comb points or cutting through the side.

Our observations so far have shown : First, that the most destructive insects are the beetles or sheathed-winged insects. With the exception of one moth and one mite, all the insects received at the University and mentioned in this article, are beetles. Second, that the greater part of the drugs attacked and destroyed are vegetables or vegetable products, and hence, that these need the greatest care and watchfulness. Third, that there is need of greater vigilance and more observation on the part of druggists, if these pests are to be successfully driven out. One druggist, when asked if he had ever noticed anything destroying combs, said he had never heard of such a thing ; but upon investigating his own stock, he found out of a small lot two combs that were destroyed. Yet he could hardly believe that insects are capable of such work.

I shall have nothing to say in this article as to the means of prevention and the use of repellents such as have been frequently suggested in current pharmaceutical literature. It is my desire to enter this field of investigation, and anything that the druggists of the United States can do to aid in the matter will be appreciated. Attention must be given to the life history of some of these insects. We should know what materials the insects breed in, what time they deposit their eggs, and make all the observations possible. From these notes a systematic study of the pests can be made, and results of practical value can be obtained. The Swedes, in the time of Linnæus, alarmed at the way in which their ship timber was being destroyed by a certain larva, applied to the noted naturalist for aid. He told them, that if they would sink their ship timber in the sea during the month of May, they would be bothered no further by this larva, for the beetle which is the parent of the grub deposits its eggs in the timber in the month of May, and at no other time of the year. If we had a more comprehensive knowledge concerning the

habits and life history of insects injurious to drugs, it is very probable that easy means of preservation and prevention of insect destruction might be used.

UNIVERSITY OF KANSAS, LAWRENCE.

## MEXICAN VALERIAN.

BY RAPHAEL McLAUGHLIN, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
 No. 125.

This particular variety of valerian (from *Valeriana officinalis*) is a beautiful herbaceous plant, very commonly found in the woods and damp places of Eastern Mexico. It has a perennial root, an erect channelled stem, is from three to six feet high, and terminates in flowering branches. The flowers are whitish or rose-colored and are faintly perfumed; the fruit is a capsule containing one oblong ovate seed; the leaves of the stem are attached by short broad sheaths, the radical leaves being larger and standing on long footstalks.

The roots are found in the Mexican market, either in slices or fleshy discs, from one-half to one and a half inches in diameter or in voluminous tubers; externally grayish, internally yellowish; hard and tough; fracture granular when dry; possessing an unpleasant odor and a bitter taste.

Upon plant analysis the constituents of the root were found to be as noted in the following summary:

Volatile oil, . . . . .	3'33
Oleoresin, . . . . .	4'30
Wax and fat, . . . . .	1'09
Valerianic acid, . . . . .	0'91
Mucilage, . . . . .	4'50
Pectin, . . . . .	1'35
Undetermined extractive, . . . . .	22'80
Pararabin, . . . . .	1'15
Lignin, . . . . .	9'68
Cellulin, . . . . .	30'84
Loss, . . . . .	1'70
Moisture, . . . . .	11'65
Ash, . . . . .	6'70

100'00

In addition to the above, there were obtained distinct quantities of a glucoside in a crystalline condition, by pouring a concentrated

alcoholic extract of the drug into acidulated water, and agitating the clear filtrate with ether. A similar result was obtained by treating the commercial European variety, as found in this market, in the same manner, although the amount of crystals obtained was much less.

The amount of volatile oil, as given in the above summary, being much in excess of that found in the European variety, it was decided to confirm this by distilling a quantity of the drug with water. Three pounds of the coarsely powdered drug treated in this manner yielded a distillate, which, when freed from valerianic acid, weighed one and six-tenths ounces, equivalent to 3.33 per cent. Undoubtedly the exact amount of volatile oil was somewhat in excess of the above figure, since a portion of oleoresin necessarily consisted of volatile oil.

## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*Sedatin*, a new patented sedative, is chemically para-valerylphenetidine manufactured by the action of valerianic acid upon phenetidine or by the action of phenetidine hydrochlorate upon sodium valerianate; instead of valerianic acid or its sodium salt valeryl chloride or valerianic anhydride may be utilized. The product crystallizes in fine needles, boils at 350–360° C., and is only slightly soluble in benzin, ether, chloroform, acetone and cold ethyl and methyl alcohols, quite soluble in the last two solvents when hot. —Rundschau, 1893, 497.

*Fat and oil examinations.*—The detection of the unsaturated fatty acids as constituents of fats and oils was made possible by the researches of Hazura; the method depended upon the separation of the lead salts of the unsaturated fatty acids by treatment with ether, liberating the fatty acids with dilute hydrochloric acid, dissolving them in aqueous alkali and oxidizing with potassium permanganate solution. Dr. W. Fahrion has notably simplified this tedious method, so that it is possible to carry out the oxidation of the unsaturated fatty acids in the original soap solution; the modification is possible because of the following facts: The saturated fatty acids are not affected by potassium permanganate solution so long as unchanged unsaturated fatty acids are present; petroleum-ether



will dissolve saturated and unsaturated fatty acids but will not dissolve the oxidation products of the latter; the oxalic acid produced by the oxidation of the glycerin remains in the aqueous solution and, hence, does not interfere. Ten gm. of the fat placed in a capsule of 1.5 litre capacity are saponified with 10 gm. sodium hydrate dissolved in alcohol; after the evaporation of the alcohol the soap is dissolved in about one litre water, the solution heated to the boiling point and dependent upon the iodine-figure, from 10–25 gm. potassium permanganate in 5 per cent. solution added, the mixture boiled for a short time, filtered, the filtrate acidified with hydrochloric acid and allowed to cool; the precipitate is collected upon a linen strainer, thoroughly expressed and perfectly extracted with petroleum-ether; the remaining insoluble portion consists of the oxidation products of the unsaturated fatty acids which are insoluble or only slightly soluble in water; for the detection of these water-soluble oxidation products the acid filtrate after the oxidation must also be examined according to directions to be given later. The oxidation products are as follows: *Dioxyxystearic acid* (from oleic acid) crystallizes in rhombic plates, insoluble in water, easily soluble in hot alcohol, difficultly soluble in cold alcohol and ether; melting point  $136.5^{\circ}$ , solidifying point  $119-122^{\circ}$  C.

*Trioxystearic acid* (from ricinolic acid) crystallizes from boiling water in microscopic needles, insoluble in cold water, benzol, carbon disulphide, petroleum-ether and chloroform, difficultly soluble in ether and cold alcohol, easily soluble in hot alcohol and glacial acetic acid; melts at  $140-142^{\circ}$  C. *Isotrioxystearic acid* (from ricinolic acid) differs from the preceding by its easy solubility in ether and a lower melting point,  $110-111^{\circ}$  C. *Tetroxystearic acid* or *sativic acid* (from linolic acid) appears under the microscope as long needles or prisms; melts at  $173^{\circ}$ , soluble in 2,000 parts of boiling water, insoluble in cold water, ether, carbon disulphide and chloroform, difficultly soluble in cold alcohol, easily soluble in glacial acetic acid and hot alcohol. *Hexaoxystearic acid* or *linusic acid* (from linolenic acid) rhombic plates or needles melting at  $203-205^{\circ}$  C. more soluble in water than sativic acid, difficultly soluble in alcohol, insoluble in ether. *Isolinusic acid* (from isolinolenic acid) prismatic needles melting at  $173-175^{\circ}$  C., difficultly soluble in cold water, easily soluble in alcohol and boiling water, insoluble in ether, benzol, carbon disulphide and chloroform. (Benedikt, Analyse der

Fette u. Wachsarten.) *Azelaic acid* is a secondary oxidation product of oleic, linolic and the linolenic acids.

In many cases the above method may be made even more expeditious, as in cases where it is only a question if certain drying acids like linolic acid are present in a non-drying oil; 10 gm. are oxidized with 10 gm. permanganate of potassium as stated, the alkaline filtrate acidulated with HCl gives the precipitate of oxidized and non-oxidized fatty acids which are not treated with petroleum ether, but boiled with about one litre of water and filtered without cooling; the filtrate is made faintly alkaline, evaporated to 100-150 cc., transferred while still warm to a separatory funnel, acidified with HCl, allowed to become cold and agitated with ether, which will dissolve the azelaic acid and any fatty acids passing through the filter so that no solids are suspended in the ethereal solution of the fat or oil containing only oleic acid as the fluid acid; on the other hand, if only small quantities of linolic acid are present in the fat or oil examined white flakes of sativic acid will be seen suspended in the lower part of the ethereal layer.

*Butter* and *tallow* examined in this manner gave no evidence of sativic acid and hence contained no linolic acid; *cotton-seed oil* and *lard* were shown to contain linolic acid, thus offering in the case of lard some explanation of the discrepancies in the iodine figure. *Dioxystearic acid* isolated from tallow, butter and lard and identified by its combining weight was found to melt at 124-126° C.; *satwic acid* obtained from cotton-seed oil and lard and identified by ultimate analysis melted at 152° C.; Hazura gives as the melting points of these two acids 137°, and 173°, respectively.—Chemiker Ztg., 1893, 610.

*Test for monatomic alcohols.*—1-2 cc. of an aqueous methyl violet solution (0.5 in 1000.0) are added with 0.5-1 cc. of an alkaline polysulphide solution to 2-3 cc. of the liquid to be tested for monatomic alcohols; in the presence of the latter, the test becomes cherry or violet-red in color without becoming turbid and after prolonged standing the colorations may change. In the absence of this class of alcohols the test becomes greenish blue, separating after some time reddish-violet flakes, the liquid itself becoming yellow. Methyl, ethyl, normal and iso-propyl alcohols give a cherry red color, while tertiary- and iso-butyl alcohols, iso-butyl-carbinol and allyl alcohol give a violet-red color. The test

is not suitable for the detection of traces of these alcohols, but is serviceable as a class reaction. The test is not given by polyatomic alcohols, carbohydrates, acids, phenols, aromatic compounds, etc.—Dr. B. v. Bitto, *Chemiker Ztg.*, 1893, 611.

*Fish-oils.*—The examination of a number of different fish-oils demonstrate that the solid fatty acids are made up in the main of palmitic acid with small quantities of stearic acid; the liquid fatty acids are not identical with any of the known acids: *Asellic acid*,  $C_{17}H_{32}O_2$ , and *jecoric acid*,  $C_{18}H_{30}O_2$ , isomeric with linolenic acid, to which the easy oxidation of the oils is due; both of these acids are oxidizable by alkaline permanganate of potassium solution yielding characteristic oxy-acids; the ultimate analysis of the oxy-jecoric acid gave results indicating the presence of a third acid possibly isomeric with linolic acid.—Dr. W. Fahrion, *Chemiker Ztg.*, 1893, 684.

*Red phosphorus*, also well known as *amorphous phosphorus*, has been proven by J. W. Retgers to be crystalline and doubly refracting, by examining the powder, immersed in di-iodomethane; the thinnest fragments were found to be transparent, having a beautiful carmine or scarlet color. It is possible that the so-called metallic phosphorus, which also in minute fragments transmits a red light, is nothing more than a better crystallized red phosphorus; should this be verified there would be but two modifications of phosphorus: the *yellow* crystallizing in the regular system and the *red* belonging to the hexagonal system.—(*Ztschr. anorg. Chem.*) *Chem. Repert.*, 1893, 142.

*Tribromphenol-bismuth*, considered by Professor Hueppe, of Prague, to be a specific against cholera, is a neutral, odorless, tasteless, insoluble, non-poisonous, yellow powder, behaving indifferently towards the mucous membranes and digestive organs; it contains 150 per cent. tribromphenol and 49.5 per cent. bismuth oxide; the dose for an adult is 5–7 grams, given in single doses of 0.5 gram.

*Beta-naphthol-bismuth*, also recommended as an intestinal antiseptic in cholera and diarrhoea, contains 80 per cent. bismuth oxide; it is a neutral, odorless, brown powder, insoluble in water. The dose is one to two grams a day. Hueppe gives the following scale of phenol-compounds, arranged according to their effectiveness against the comma-bacillus; Tribromphenol-bismuth, beta-naphthol-

bismuth,  $\alpha$  and  $\beta$ -naphthol salol and naphthol, cresalole, salol, sozoiodol.—Pharm. Post, 1893, 221.

*Sensitive test for sucrol* (para-phenetolcarbamide).—Traces of sucrol evaporated in a small capsule with several drops fuming nitric acid leave, after a violent reaction, an orange colored, resinous mass, soluble in alcohol, chloroform and ether; if the residue be mixed with a glass rod, with two drops each of liquefied carbolic acid and concentrated sulphuric acid, an intense blood-red color is produced, not fading for a considerable time; the mixture is soluble in chloroform, with a beautiful red color, but this fades rather quickly.—Dr. N. Wender, Pharm. Post, 1893, 269.

*Cathartic acid*, the active principle of senna, prepared by the directions of previous investigators, Kubly and Stockmann, was found to be of questionable activity. An improved method yielding a satisfactory product was found in the following: 2 kilos senna leaves were covered with boiling water; after 24 hours the liquid was expressed and evaporated in vacuo, the residue treated with 95 per cent. alcohol for 24 hours and the liquid decanted; this operation was repeated and the combined and filtered alcoholic solutions precipitated by neutral acetate of lead; the precipitate was thoroughly washed, made into a paste with alcohol and decomposed with hydrogen sulphide; the excess of the latter was removed by a current of air, the mixture heated on a steam bath for one-half hour (using an inverted condenser) and the alcoholic solution separated; the residual lead sulphide was again extracted and the combined filtrates mixed with ether, which caused the separation of a pale yellow precipitate; this was dissolved in 30 per cent. alcohol and evaporated at a temperature not exceeding 50° C. The yield was 12–15 gm.; the product is amorphous, difficultly soluble in cold water, readily soluble in boiling water; the best solvent is a 30–40 per cent. alcohol; ether, benzin, chloroform, petroleum-ether are without solvent action. The formula from the results of combustions appears to be  $C_{30}H_{36}NO_{15}$ . Pharmacological experiments by Dr. Kobert and others upon the lower animals demonstrate that they require large doses for satisfactory action not accompanied by any symptoms of poisoning; numerous experiments upon man prove that 0.1–0.15 gm. is a sufficient dose as a painless cathartic acting in from 3 to 8 hours.—A. Gensz (Dorpat Dissert.), Pharm. Post, 1893, 281.



*Bessarabian rhubarb*, examined by J. Mörbitz, yielded 0.85 per cent. of pure chrysophanic acid and 0.25 per cent. of pure emodin; attempts to isolate cathartic acid failed. The powdered root taken in doses of as much as five grams by different persons gave negative results as a cathartic.—Pharm. Ztschr. f. Russl., 1893, 241.

*Fatropa curcas*.—The seed constituents are as follows: Water, 7.2 per cent.; ash, 10.2 per cent.; oil, 33.86 per cent.; sugar, coloring matter, cellulose, 47.83 per cent.; albuminoids, 1.71 per cent. The pale yellow oil extracted with ether uniformly deposited albuminous matters upon boiling; the iodine absorption was 130; saponification figure 231 and the volatile acids (Reichert-Meissl 2.5 gram) 0.55. Palmitic and myristic acids along with an acid, having the formula  $C_{17}H_{32}O_3$  and called curcanolic acid, and a resinous body were detected. Experiments having for their object the isolation of the active principle of the seed failed, but it was found that water was its best solvent and removed it from both embryo and cotyledons (after the removal of the oil); heating this aqueous solution to 60° C. and the addition of any of the albuminoid precipitant destroyed the activity; it, therefore, differs sharply from ricin, but resembles the poisonous albuminoid of the spider and the mushroom, *Amanita phalloides*, Fr.; the name *curcin* is proposed for it. Physiological experiments with the root of *Fatropa macrorhiza*, Benth., establish purgative properties, but owing to the poisonous nature of the root the greatest caution must be exercised in its use.—August Siegel (Dissert. Dorpat), Pharm. Ztschr. f. Russl., 1893, 242.

*Codeine salts*.—From a very elaborate investigation by W. Göhlich, having for its object the correcting and further study of the salts and other derivatives, the main results are abstracted. Codeine has the formula  $C_{18}H_{21}NO_3 \cdot H_2O$ ; the crystallized alkaloid melts at 152–153°, the anhydrous at 155° C. The hydroiodate, hydrochlorate, hydrobromate and acetate (very soluble) crystallized from aqueous solutions with  $2H_2O$ ; the hydroiodate crystallized from alcoholic solution with only one molecule water; the salicylate and the aurochloride (decomposed at 100°) are anhydrous; the platinochloride, according to conditions, contains either 4 or  $6H_2O$ ; the sulphate (efflorescent) and chromate (decomposed by exposure to light), contain  $5H_2O$ . With mercury chloride, codeine hydrochlorate unites to form the crystallizable salt  $(C_{18}H_{21}NO_3HCl)_2 H_9Cl_2 + H_2O$ .

Codeine does not unite with ethylene chloride but unites with ethylene bromide to form  $(C_{18}H_{21}NO_3)_2 C_2H_4Br_2$ . In the literature of codeine mention is made of two *chlorocodides*  $C_{18}H_{20}NO_2Cl$  (Cl replacing OH), these have been proven to be identical; if heated under pressure with KOH both yield *apocodeine*,  $C_{18}H_{19}NO_2$ , which is a resinous mass. Cold concentrated sulphuric acid forms *sulphocodide*,  $C_{18}H_{20}NO_2.HSO_3 + 5H_2O$ ; sulphuric acid with an equal volume of water assisted by heat converts codeine into the *amorphous* codeine of Armstrong, but this can also be obtained crystallized and then is identical with the *pseudocodeine* of E. Merck; the melting point of anhydrous pseudocodeine is  $180^\circ$ ; the hydrochlorate and hydrobromate contain between one and two molecules of water of crystallization, the sulphate  $2H_2O$ , the aurochloride  $3H_2O$ , while the platinochloride is anhydrous.—Arch. der Pharm., 1893, 235–290.

*Stachys tubrifera*.—The tubes are used as a food, and contain large quantities of a crystallizable carbohydrate, *stachyose*, and small quantities of glutamine and tyrosine. Besides these substances two nitrogenous bases have been discovered in the precipitate with auric chloride, the light colored portion being converted into the platinochloride, and this crystallized from water; two salts were present, one yellow, granular and difficultly soluble in water in small quantity, the other large, orange red, and very soluble in water; the latter is the *stachydrine* platinochloride, which for further purification, was converted into the mercuric chloride double salt, and this into stachydrine hydrochlorate, 100 kilos of the fresh tubers (containing about 20 per cent. dry substance) gave 10–12 grams of the hydrochlorate. The alkaloid crystallizes from water (forming a *neutral* solution) and alcohol in colorless, transparent, deliquescent crystals; dried at  $100^\circ$  it melted at  $210^\circ$  C., and had the formula  $C_7H_{13}NO_2$ ; the hydrochlorate (dried at  $100^\circ$   $C_7H_{13}NO_2HCl$ ) forms large prisms, very soluble, but not deliquescent, in water and alcohol. It gives towards reagents the same reactions as *betaine*, but differs from it in the fact that the betaine hydrochlorate is insoluble in alcohol.—A. v. Planta and E. Schulze, Arch. der Pharm., 1893, 305.

# ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*Animal charcoal, as a pill excipient*, is used by M. E. Voilé (*Bull. de la Soc. de Pharm. de Bordeaux*, May, 1893, p. 142), as follows :

*Creasote pills*.—Place in a porcelain mortar 2 gm. animal charcoal, add 1 gm. or 43 drops of creasote, beat rapidly and if the creasote is not entirely absorbed add more animal charcoal (about 0.60 gm.) in small portions. The mass is now nearly pulverulent and in order to bind it, it is necessary to add 0.20–0.25 gm. turpentine; then knead the mass rapidly, and divide into 20 pills.

*Croton oil pills*.—Take of croton oil 49 drops, and animal charcoal sufficient for 20 pills. For these pills it is unnecessary to use turpentine to bind the mass.

Animal charcoal is also useful as an excipient in pills of a more complicated formula, where for instance 1 gm. creasote is associated with 1 gm. each of tannin and iodoform; allow the animal charcoal to absorb the creasote, as in the above directions for creasote pills, then add the tannin and iodoform, mix intimately and bind the mass with turpentine. The caustic taste of the creasote is considerably lessened by the animal charcoal, so that it is only necessary to roll the pills in magnesia or tolu. By means of animal charcoal the above medicaments can also be administered in the form of cachets; the author gives the following two formulas:

(1) Creasote, 2 gm.; washed animal charcoal, 5 gm.; mix intimately and divide into 10 cachets.

(2) Oil of turpentine, 5 gm.; washed animal charcoal, 10 gm.; mix intimately and divide into 10 cachets.

*Tar pills*.—Dr. Ivanoff gives, in *Semaine médicale*, of May 13, 1893, a new process of preparing these pills, using clay as the excipient, of which only a very small quantity is necessary to obtain a mass of pillular consistency. The author has found it possible to make pills of small size, containing 13 cgm. of tar; they are preserved in glycyrrhiza powder.

*New pill excipient*.—Prof. Carles (*Bull. de la Soc. de pharm. de Bordeaux*) gives the following process for preparing pills of alterable medicaments, such as potassium permanganate, silver nitrate, gold chloride, the iodides of mercury, etc., which with this excipient

do not change in appearance and preserve the active principle indefinitely: Triturate, kaolin 2; anhydrous sodium sulphate, 1; and water, 1; the mass remains plastic during 6–10 minutes, but after fifteen minutes becomes so hardened that it can be thrown on the floor without danger of breaking. With this mass the medicament in fine powder is incorporated.

*Detection of hydrocyanic acid.*—Dr. Soura Lopez (*Rev. dos curs. de med. do Rio de Janeiro*, through *Jour. de pharm. et de chim.* June, 1893, p. 550) publishes the following process, based upon the reaction of mercuric cyanide with solution of ammonium chloride. Milk of lime in excess is added to the suspected material and heated to 100° C. on the water-bath. The lime decomposes the ammoniacal salts, disengaging all the ammonia; after the cessation of the alkaline fumes, the hot solution is filtered and introduced into a retort with an excess of pure bicarbonate of sodium; heated to 60° the sodium salt decomposes the alkali cyanides, liberating hydrocyanic acid, but does not attack potassium ferrocyanide, which is decomposed by carbonic acid slowly after several hours, with the gradual evolution of hydrocyanic acid. If the mercuric cyanide is combined with potassium ferrocyanide, sodium sulphide is placed in the retort, this acting upon the mercuric cyanide by double decomposition, in producing mercuric sulphide and sodium cyanide; then sodium bicarbonate will liberate hydrocyanic acid, acting upon the sodium cyanide. If the distilled product is added to silver nitrate solution, containing hydrocyanic acid in the form of silver cyanide, traces of the acid will remain unnoticed, since the silver nitrate solution dissolves a little of the cyanide; the author therefore uses ammoniacal silver nitrate, taking care, however, not to have the ammonia in excess. For determining the cyanide as Prussian blue, dissolve the silver cyanide in solution of sodium hyposulphite, add ferrous sulphate and then an excess of potassa; agitate the solution without excluding the air and add a slight excess of hydrochloric acid. The Prussian blue must be separated at once by filtration, to prevent the formation of silver sulphate, and to obtain a sensitive end reaction.

*Estimation of caffeine.*—Alex. Grandval and Henri Lajoux publish the following process in *Jour. de pharm. et de chim.*, June, 1893, pp. 545 to 549:

The substance to be examined is finely pulverized, 5 gm. of it



are moistened with a mixture of 5 gm. of 66 per cent. ether and 1 gm. ammonia water, and placed in a continuous extraction apparatus with 50 cc. chloroform. The extraction is complete when a drop of the chloroform, upon evaporation, leaves no residue. The solution is distilled and to the dried residue, 1 cc.  $\frac{1}{10}$  sulphuric acid added, for the purpose of obtaining the caffeine colorless. The acidulated residue is extracted with several small portions of boiling water and filtered, keeping the filter covered with a glass plate, so as to prevent the crystallization of the caffeine upon the filter. The yellowish filtrate, supersaturated with ammonia, is evaporated to dryness on a water-bath, when a large portion of the coloring matter forms, with the ammonium sulphate, a kind of compound insoluble in chloroform. The dry residue is treated with chloroform, and the solution filtered; the container and filter are washed until a drop of the filtered liquid leaves no residue upon evaporation. If the chloroformic solution is evaporated very slowly, the product is colorless or nearly colorless caffeine, perfectly crystallized and entirely free from tannin. The process requires no more than three hours and the following are some of the results obtained with it, in the author's hands, for 1,000 parts of the material: Black Souchong tea 29 parts, green coffee (mixture) 9.88 parts, roasted coffee 9 parts, and kola nut 23 parts of caffeine.

*Duboisine*.—Belmondo (*Riv. sper. di fren. e di med. leg.*, through *Nouv. Rem.*, May, 1893, p. 240) reports the result of a large number of injections of duboisine, and considers it equal to hyoscine in its sedative action, and superior to chloral as a hypnotic. He uses 0.0005–0.0015 gm.; higher doses producing loss of appetite and vomiting.

Mazzochi and Antonini (*Rif. med.* through *Nouv. Rem.*, May, 1893, p. 239) use the *neutral sulphate of duboisine* in the treatment of mental disorders, in doses of 0.0005–0.002 gm., and consider both atropine and morphine inferior to this salt, in most cases a five hours' sleep having ensued about 20 minutes after the injection.

*Preparation of oxygen*.—Achille Tonneau uses the following simple process by which the danger of explosions and the inconvenience of having the product contaminated with chlorine are avoided. Into a Woulff's bottle, of 2 or 3 litres capacity, supplied

with a funnel tube containing concentrated acetic acid, is introduced a mixture of 100–200 gm. binoxide of manganese and peroxide of barium, with sufficient water to cover it, and to prevent foaming a layer of oil is added. Several cc. of the acid are introduced through the stopcock of the funnel tube, when the reaction commences at once and the oxygen is passed to a wash-bottle, and from there is received into a rubber bag. For introducing air into the apparatus and regulating the disengagement of the gas, a rubber bulb is attached to the flask by means of rubber tubing. The apparatus is illustrated in *L'Union pharmaceutique*, May, 1893, p. 233.

*Emulsion of salol and camphor*.—M. Lerich, in *Bulletin méd. de l'Algerie*, gives the following process:

Mix ten parts each of salol and camphor in a mortar, and when the mixture is entirely liquefied add ten parts almond oil, then 15 parts gum arabic. Now add 30 parts distilled water, beat vigorously, and increase to 300 parts, added in small portions at a time.

*Salol*, 10 gm., dissolved in almond oil 30 gm., and injected subcutaneously has been used by M. Grossi with good results in tuberculosis; he commences with 5 gm. of the above solution per day, and increases it to 20 gm. The injections have generally no local action, but, when they have been repeated a number of times, must be discontinued for a while.—*Med. Nevigk.*, through *Nouv. Rem.*, May, 1893, p. 223.

*Scopolamine*, according to Prof. Kobert, being a mydriatic, produces physiological effects, differing from those of atropine; its action on the brain is a paralyzing one, and it retards the pulse, instead of accelerating it, as does atropine. The clinical observations of Dr. Rahlmann show that the *hydrochloride of scopolamine* is superior to either hyoscyamine or atropine as a mydriatic, analgesic and antiphlogistic, as it does not occasion the dryness of the throat, the redness of face, nor the acceleration of pulse, observed under the influence of atropine. In glaucomatous conditions it can be injected into the eye, in solution of one or two per cent. strength.—*Semaine médicale*.

*Apocodeine*, having been credited by Mathiessen and Burnside with emetic properties like apomorphine, L. Guinard (*Lyon médical*, May, 1893) has experimented with this medicament, and also with its hydrochloride, administering to dogs as high as 8 cgm. but with-

out producing any emetic effects or nausea ; and the result was the same whether administered by the mouth, or by intraveinuous or hypodermic injection. (See also American Journal of Pharmacy, Nov., 1891, p. 542.)

*Nuclein*, according to Germain Sée, is a substance extracted from the nucleus of the cells of the splenic pulp and more recently from various other cells. In its chemical character it is distinct from the albumins as it contains phosphoric acid ; it is a colorless or yellowish powder, insoluble in water and alcohol ; soluble in alkalis. Administered in doses of 2 or 3 gm. it has no action on man, beyond the one phenomenon, that it increases the number of white globules, which are veritable phagocytes, and it is likely to prove of great service in the diagnosis of latent tuberculosis.—*Nouv. Rem.*, May, 1893, p. 221.

*Rosen's liniment* deposits the oil of nutmeg which it contains, and which is again suspended by agitation as needed. Made with 60 per cent. alcohol the deposit forms but slowly, and when brandy is substituted it floats entirely on top ; but such a modification diminishes the rubefacient action. P. Vigier proposes the addition of 1 or 2 gm. castor oil, but according to Fr. Gay, while this gives good results, the deposit still separates rather quickly. This author (*L'Union pharm.*, March, 1893, p. 137) proposes to emulsionize the oil with tincture of quillaia, as this has no chemical action on the oil and produces the desired effect. The following is his formula : Expressed oil of nutmeg, 5 gm.; volatile oil of cloves, 5 gm.; tincture of quillaia, 10 gm.; spirit of juniper, 80 gm.

*Artificial gum arabic*.—According to *Rev. de chim. ind.*, a product possessing the properties of gum arabic is obtained by boiling 1 kgm. flaxseed with 8 kgm. sulphuric acid and 10 litres water, filtering after three or four hours, adding four times the volume of alcohol, washing and drying the precipitate. The product is amorphous, colorless, insipid and dissolves in water like gum arabic.

*Milk*, when saturated with carbonic acid under pressure, will undergo no change within a week, according to C. Nourry and C. Michel (*Compt. rend.*). However, if it is heated to 45–80°, the curds form as usual.

THE STROPHANTHUS SEED OF COMMERCE.<sup>1</sup>

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society

The difficulty of obtaining *Strophanthus* seed of uniform character, agreeing with the description given in the "Addendum" to the Pharmacopœia, is well known. Except by purchasing the follicles, it is now almost impossible to procure unmixed seed. This difficulty has apparently arisen from a supposition on the part of the collectors that all kinds of *Strophanthus* possess the same properties, and on the part of merchants, that *Strophanthus* seeds from any part of Africa would sell. At all events, there is circumstantial evidence to prove that the *Strophanthus* seed of commerce very frequently consists of a mixture of seeds derived from various species. When the seed is sown, it gives rise to young plants, possessing different leaves, etc., and evidently belonging to different species. The seeds themselves also differ in external characters. In many cases, also, seeds presenting a great similarity in color and general appearance possess different cell contents and a different active principle. In the hope of promoting the importation of a uniform product and of enabling pharmacists to ascertain with greater accuracy than heretofore the genuineness and quality of the seeds they employ, I propose to give a *résumé* of what is known concerning this powerful drug and its botanical sources.

The species of *Strophanthus* are as yet very imperfectly known. The two chief centres of distribution of the plants of this genus are tropical Africa and Southeastern Asia. In the "Genera Plantarum" (Benth. and Hook. f., vol. ii, p. 714) the number of species is given as eighteen, but in a recent revision of the genus by Dr. F. Pax ("Engler Jahrbucher," 1892, pp. 362-386) seven new species have been added to the list, of which six are African and one Malayan. The distribution of the species is given as follows:

WEST AFRICA. Senegambia, *S. laurifolius*, *S. sarmentosus*.

Sierra Leone. *S. sarmentosus*, *S. hispidus*.

Niger Territory. *S. scaber*.

Cameroons. *S. Preussii*, *S. Bullenianus*.

Gaboon. *S. Bullenianus*, *S. gracilis*.

Congo. *S. Ledieni*.

<sup>1</sup> Phar. Jour. and Trans., April 22 and May 13, pp. 868 and 927-931.



Angola. *S. Preussii*, *S. Schuchardti*, *S. intermedia*.

Amboland. *S. Amboiensis*.

EAST AFRICA. Sea Coast. *S. Eminii*.

Zambesiland. *S. Kombe*.

ZANZIBAR. Delagoa Bay. *S. sarmentosus*.

Mozambique. *S. Petersianus*.

SOUTH AFRICA. Cape of Good Hope. *S. speciosus*.

Madagascar. *S. Boivini*, *S. Grevei*.

INDIA.—MALAYA. South China. *S. divergens*.

E. INDIES.—JAVA. *S. Wallichii*, *S. Wightianus*, *S. brevicaudatus*, *S. puberulus*, *S. Jackianus*.

Phillipines. *S. Cumingii*.

This list, however, by no means represents either the probable number of African species or their distribution, for the botany of Central Africa has been very imperfectly investigated. Even since the publication of Dr. Pax's list another species, *S. Fischeri*, Asch. and Schum., has been published, and in the Royal Herbaria at Kew and South Kensington there exist unnamed species which do not agree with any of those already published, but which, for want of more complete material, have not as yet been described. Of all the species known, only the following appear to have been collected with fruit—*S. hispidus*, *S. Eminii*, *S. Ledieni*, *S. Bullenianus*, *S. caudatus* and *S. Fischeri*. It is, therefore, not possible to refer all the follicles met with in commerce to their botanical source. At present we do not know how far the follicles vary in size on plants of different ages or growing under different climatal or terrestrial conditions, although there is evidence to show that some of the species vary considerably in these respects in different districts. Unfortunately, the morphological characters of the seeds also vary, to some extent, in the same follicle, the shape and size of the seed and the length of the awn and plume being dependent upon the position the seeds occupy, those in the middle of the fruit being usually the most developed as regards the awn and plume, whilst the seeds near the base of it are often shorter and thicker. It is therefore obvious that when removed from the follicle it is not easy to find morphological characters for separating the seeds of different species. This difficulty is further increased by the fact that seeds, which to the naked eye are identical, may be derived from very different species, and may differ very considerably in their histological

features and chemical constituents. The difficulty attending the separation of genuine or official seed from that of other species has recently to a great extent been overcome by a very careful examination of the seeds of commerce by Herr C. Hartwich (*Arch. der Pharm.*, Bd. 231, Heft vi, pp. 401-433).

It has already been shown by Professor T. R. Fraser that the seeds investigated by him, and which are now the official kind, contain a glucoside, strophanthin, which gives a marked green reaction with concentrated sulphuric acid ("Trans. Roy. Soc. Edinb.," vol. xxxv, pt. iv, p. 1011), and this fact was turned to account by Hanausek (*Pharm. Journ.* [3], xvii, p. 973) as a means of ascertaining the genuine character of the seeds. Blondel ("Les Strophanthus du Commerce," Paris, 1888, p. 55) examined the structure of the follicles and seeds and showed that several of the commercial kinds exhibited histological differences. Herr C. Hartwich, in the paper already alluded to, has carried these investigations a step further by making a careful microchemical examination of the cell contents of the seeds, and has arrived at the following conclusions :

(1) That the presence of strophanthin can be detected only in a few of the commercial varieties.

(2) That several kinds contain crystals of oxalate of calcium in the cotyledons, and that the presence of this constituent is, as a rule, indicative of the absence of strophanthin, such seeds giving no green reaction with concentrated sulphuric acid ; the only exception known being the seed from the Island of Los, which contains oxalate of calcium as well as a trace of strophanthin. The absence of the calcium oxalate does not, however, necessarily indicate the presence of strophanthin, since the seeds of *S. Fischeri*, and of the glabrous seed from Lagos, contain neither raphides nor strophanthin.

(3) Starch is constantly present in some species, but not in others ; even when present it is not always easily detected, unless the seeds be first treated with ether to remove the fatty oil.

The presence of oxalate of calcium and of starch, therefore, can be used only as confirmatory evidence where necessary to discriminate between the sorts which do not give the strophanthin reaction. As at present, however, the pharmacist is only concerned to ascertain the genuineness of the *seeds containing strophanthin*, the sulphuric acid test is, for practical purposes, quite sufficient. The most

satisfactory method of applying the test is to cut a thin transverse section of the seed with a razor, place it on a glass slide and add a drop of concentrated sulphuric acid. If the seed contains strophanthin, the endosperm or embryo or both will exhibit a dark green coloration, after the lapse of a minute or more, according to the species operated on. In seeds containing no strophanthin, a red color, of different intensity or shade in different species, is slowly developed.

To ascertain the presence of strophanthin in an extract or tincture of the seed, a piece of the former, about twice the size of a pin's head, or three drops of the latter, may be mixed with half a drop of solution of perchloride of iron and three drops of concentrated sulphuric acid. A brown precipitate is formed which becomes green in an hour, the color persisting for three hours.

A feature which may be employed to distinguish seeds of the genus *Strophanthus* from those of allied genera has been pointed out by Herr Hartwich. In the epidermal cells of the seeds a ring-like or annular thickening is found, which is absent in the seeds of any other apocynaceous genus with which *Strophanthus* seeds could possibly be confounded. In the seeds of *Strophanthus glaber*, Max Cornu, M.S., and in *Kickxia Africana*, however, a different thickening, in the form of linear bands (balkenförmige) has been observed.

For convenience of comparison, the seeds examined by Herr Hartwich may be grouped as follows :

- I. Hairy brown seeds of the *S. hispidus* type.
- II. Hairy grayish green seeds of the *S. Kombe* type.
- III. Hairy whitish seeds with a dense coat of long hairs.
- IV. Glabrous seeds. (See Table A.)

I have compared all the specimens existing in the Museum of the Pharmaceutical Society so far as regards size and chemical reaction, with the results recorded in the table. (See Table B.)

On comparing these tables it will be observed that, if the geographical sources can be depended on, there are brown seeds containing no strophanthin which come from the same countries as other brown seeds in which strophanthin can be detected, and that the same remark applies to the grayish green seeds. Even in a specimen received from Professor Fraser, as the seed with which his recent experiments had been made, two kinds of seed (Nos. 9 and 10) were present.

The relative size of the seeds cannot well be expressed in measurements of length and breadth, since in some varieties the seeds taper more than in others. The measurements of the awn and plume are those of seeds taken from the middle of the follicle, and the measurements of the length of the follicles in the Society's Museum are taken from those containing mature seeds, the sign + indicating that the follicle is broken at the apex and is probably longer when perfect. The breadth is not given, since all the follicles are open in different degrees, and a comparison would not be of practical value.

No. 1 is undoubtedly the seed of the plant described as *S. hispidus*, and Nos. 2, 3, 4, 5 are probably derived from forms of the same species.

No. 6 was received from Dr. J. F. Easmon, and the only herbarium specimens of *Strophanthus* received from him appears to be *S. Preussii*, but he does not state that the seeds and fruit were derived from the same plant.

No. 8 was received from Mr. G. F. Scott Elliott, who observed only two species in Sierra Leone, *S. hispidus* and *S. sarmentosus*, and he believes that the fruit was probably gathered from the latter, since the seeds give a different reaction to those from *S. hispidus*.

With No. 11 some leaves were received as those of the plant yielding the seed, and these leaves possess the curiously punctate appearance of those of *S. gracilis*. No. 9 was no doubt obtained from *S. hispidus*, var. *Kombe*, the plant figured by Professor Fraser. No clue can be obtained as to the botanical source of the other specimens.

It should be observed that, in applying the sulphuric acid test, allowance must be made for the fact that in some seeds the color is developed much more slowly than in others, and in a slightly different manner in different varieties. Thus in *S. Kombe* the endosperm becomes dark green almost immediately, and this color usually spreads over one of the cotyledons, the other becoming purplish. In *S. hispidus*, the green color does not appear until after the lapse of a minute or longer, and does not usually spread to the cotyledons. The purplish tint of the cotyledons does not readily darken as it does in *S. Kombe*. In some apparent varieties of *S. hispidus*, the color of the cotyledons becomes of a bluish rather than a reddish purple. In the species containing no strophanthin the seeds vary to a certain extent, also, in the rapidity with which the red color



is produced and the ultimate shade that it reaches, in some cases the tint being carmine red, and in others rose or bluish red. These tints seem constant for each variety, and a little practice soon renders it comparatively easy to discriminate between the seeds from different sources, especially when taken in conjunction with the slight external differences in the shape of the seed, the greater or less density of its hairy coat, and the more or less regularity in the arrangement of the hairs in lines.

It must not, however, be taken for granted that seeds giving the red reaction are not poisonous, for M. Arnaud has shown that the seeds of *S. glaber* (which give a red reaction) contain a considerable quantity of ouabain, a glucoside, similar to strophanthin in its physiological properties, but two to four times stronger in its action on small animals. This glucoside gives no coloration with concentrated sulphuric acid for a considerable time, and then only a pale brown tint, nor do the other mineral acids produce any color reaction with it. It is obvious, therefore, that as it is at present unknown whether all the seeds giving the red reaction are poisonous or not, and that as some may be more poisonous than the official seeds, we have here a factor that adds considerably to uncertainty of action of preparations made from mixed seeds.

The practical bearing of the facts already brought forward may be summarized as follows: It is highly desirable, owing to the occurrence of the seeds of different species of *Strophanthus* in commerce, and to the occasional mixture of such seeds, that *seeds should always be purchased in the follicle, and that a seed from each follicle should be tested with concentrated sulphuric acid.* In no other way can a reliable preparation be made, since, even if strophanthin were used, at present there is no ready means of detecting ouabain in the presence of strophanthin, should the latter be prepared from mixed *Strophanthus* seed.

It may be useful to append here a few details concerning the general features of the African species of this genus, in the hope that future travellers in Africa may endeavor to clear up the botanical sources of the varieties or seed occurring in commerce.

The species of the genus *Strophanthus* are mostly climbing shrubs, although some appear to be small trees or erect shrubs. The leaves are opposite and more or less elliptical, hairy in some species and glabrous in others. The flowers are often terminal, but

Table A.—*Strophanthus* Seeds Examined by C. Hartwich.

	Length. mm.	Breadth. mm.	Rhaphides.	Starch.	Reaction.	Follicle. cm.	Remarks.
<i>I. Brownish.</i>							
<i>S. hispidus</i> , . . . .	11-13	3-3, 5	None.	Exceptional.	{ Endosperm green, slowly. Embryo less so.	35-40	{ Follicle tapers at both ends. Awn 6-8 c. Plume 6-8 c.
Mozambique, . .	9-17	2, 5-5, 5	None.	{ in endo- sperm less in embryo.	{ End. green. Emb. red. then bluish.	—	—
German, E. Africa	14, 5-15	3, 5-4	Present.	in endosperm.	Red.	19'	—
Fogo Land (W. Africa), . . . .	12	3	Present.	—	Red.	13'5	{ Awn 1-7 c. Plume 5 c.
Niger, . . . .	11	3	Present.	{ Sparingly in endosperm.	Red.	18c.	{ Hairs partly in rows.
<i>S. "Baol,"</i> Senegal,	10-11	3	Present.	in endosperm.	Red.	15'	{ Awn 1-6 c. Plume 1-4 c.
Island of Los, . .	11	3	Present.	in endosperm.	Red.	15'	{ Follicle cylin- drical obtuse.
<i>S. Fischeri</i> , . . . .	16-17	4-5	None.	—	{ Reddish yellow, then red.	—	{ Awn 3 c. Plume 5 c. Hairs shining golden brown.
<i>II. Greenish.</i>							
<i>S. Kombe</i> , . . . .	9-15-22	3-5	None.	Present.	{ End. green rapidly.	30	—
Sierra Leone, . .	11-19	3-6	None.	None.	{ End. green. Emb. yellow then red.	—	Hairs in rows.
Senegal, . . . .	14	3-5	Present.	in endosperm.	Red.	21	—
Lagos, . . . .	13	3	Present.	None.	Red.	24'5	—
<i>S. Emini</i> ,* . . . .	15	4, 5	{ Sparingly in embryo.	None.	{ Yellowish brown, then dirty red.	—	{ Hairs in rows. Awn 6-5 c.* Plume 5-3 c.
<i>III. White.</i>							
Upper Niger, . .	9-17	4-4, 5	{ in embryo.	None.	Red.	—	{ Identical with the "woolly Zambesi" seed.
<i>IV. Glabrous.</i>							
Lagos, . . . .	13-18	4-6	None.	—	Red.	25	{ Linear thicken- ings in epider- mal cells.
Zambesi, . .	10-16	3-4	None.	Present.	Yellowish.	—	—

\* Dr. Ascherson gives the length of the awn and plume of *S. Emini* as three centimetres each.

Table B.—*Strophanthus* Seeds in the Museum of the Pharmaceutical Society of Great Britain.

	Follicle. cm.	Seed. mm.	Awn cm.	Plume. cm.	Reaction.
<i>I. Brownish.</i>					
(1) <i>S. hispidus</i> , A.D.C. (Baikie), . . . .	28	13 × 3	3	3	Endosperm green, embryo purplish.
(2) London, F.C., . .	30	13 × 3	4	2	" " " "
(3) Niger, . . . .	45	13 × 3	4	4	" " " "
(4) London, . . . .	25+	12 × 2½	1	2	" " " "
(5) London, . . . .	23+	13 × 3	3½	3½	" " " "
(6) Gold Coast, . . .	25	12 × 2½	4	2	{ Endosperm red. Embryo red.
(7) Germany, . . . .	25	13 × 3	4½	3	{ Endosperm red. Embryo bluish red.
(8) Sierra Leone, . .	20	13 × 3	2	2	Endosperm red, embryo red.
<i>II. Greenish.</i>					
(9) Fraser, . . . .	—	—	—	—	{ Endosperm green. Embryo ½ green, ½ purplish.
(10) Fraser, . . . .	—	—	—	—	Endosperm red, embryo red.
(11) Manchester, . .	25	15 × 5	3½	7	" " " "
(12) London, . . . .	25-30	17 × 4	4-5½	3	" " green, " purplish.
(13) London, . . . .	27	15 × 4	7	5½	" " " " ½ green, ½ purple.
<i>III. White.</i>					
(14) "Woolly Zam- besi," . . . .	18	15 × 5	3	2½	Endosperm red, embryo red.
<i>IV. Glabrous.</i>					
(15) <i>S. glaber</i> , Max Cornu, MS., . .	—	12-15 × 4	2	4	" " " "

in some species are lateral ; the corolla is usually of a more or less yellowish tinge, spotted or lined with purplish-red in the tube or throat of the flower. The blossom may be likened to a tobacco blossom, but has the remarkable peculiarity that each lobe of the corolla ends in a long pendent thread varying in length from 2 to 6 inches or more. At the base of each lobe and, therefore, in the throat of the corolla are small linear or triangular appendages arranged in pairs. These are longer in flowers in which the pendent threads of the corolla lobes are short. The fruit consists of two, more or less cylindrical, pods or follicles containing brownish or greenish, usually hairy, seeds terminated by an awn from one-half to three or more inches long, crowned by a tuft of hair of from one to two inches or more in length and diameter. The curious filamentous petals and plumose arrow-like seeds are the readiest means of recognizing the species of the genus.

The African species of *Strophanthus* are divided by Dr. Pax into several sections, according to the character of the leaves.

(I) HISPIDI.—Plants with hairy leaves and prominent secondary veins, transversely sub-parallel between the primary veins.

This section includes *S. hispidus*, A.DC., *S. Kombe*, Oliv., and *S. Emini*, Asch. and Pax.

*S. hispidus* is characterized by its membranous leaves and linear calyx segments, equalling in length the corolla tube. In *S. Kombe* the calyx teeth are similar but shorter than the corolla, and the seeds are greenish, not dark brown, as in *S. hispidus*. The leaves also are stouter. In *S. Emini* the calyx segments are broad, sub-foliaceous, and obtuse, and the inflorescence is lateral.

II. ACUMINATI.—Leaves prominently hairy on the under surface only, and the secondary veins not parallel.

This group includes *S. Ledieni*, Stein, and *S. Bullenianus*, Mast. In the former the flowers precede the leaves, and the corolla lobes are six times longer than the tube. In the latter the flowers are produced on leafy shoots and the corolla lobes are only twice as long as the tube.

III. TOMENTOSI.—The leaves are small, hairy on both sides, and the secondary veins are not parallel.

This section contains only one species, *S. Schuchardti*, Pax, which has the smallest leaves of any species of the genus. The leaves are densely hairy.

IV. GRACILES.—Leaves usually thin and more or less glabrous, secondary veins inconspicuous. Of this section three species are known :

(1) *S. Preussii*, Engl. and Pax, which has the leaves quite glabrous and the corolla tube dilated.

(2) *S. gracilis*, Schum. and Pax, which has leaves that appear punctate on the upper side, short scabrous hairs on the under surface of the leaf, and the scales in the corolla tube glabrous.

(3) *S. scaber*, Pax, which has leaves minutely scabrous on both sides, and the scales of the corolla tube downy.

V. SARMENTOSI.—The leaves are quite glabrous, but somewhat rigid or coriaceous, with the secondary veins evidently reticulated. This section includes five species :

(1) *S. sarmentosus*, A.DC., a climbing plant with long petioled leaves (for the genus) and the calyx lobes broadly oblong lanceolate.

(2) *S. laurifolius*, A.DC., has leathery leaves, with the secondary veins prominent underneath, and the calyx lobes narrowly elliptic.

(3) *S. Petersianus*, Klotsch, is an erect shrub with divaricate branches, with small leaves, and the calyx lobes narrowly oblong lanceolate.

(4) *S. intermedius*, Pax, has triangular calyx lobes and comparatively short corolla lobes, and the scales of the corolla are lanceolate.

(5) *S. Amboensis*, Engl. and Pax, has lanceolate calyx lobes and linear-subulate corolla scales.

Of *S. sarmentosus* there are three varieties, differing in the length of the corolla tube and limb, the length of the petiole, and the development of the lenticels of the bark. The variety *verrucosus*, Pax, is described as a shrub; it has warty lenticels on the bark. A plant possessing this character was grown by Mr. T. Christy from "Kombe" seed, and a specimen of it is in the Herbarium of the Society.

The following are the points which it is desirable for collectors of *Strophanthus* plants to observe in discriminating species :

(1) The shrubby or climbing character of the plant.

(2) The hairiness or otherwise of the leaf and the prominence of the veinlets.

(3) The relative length of the tails to the petals and of the glands at the base of the corolla lobes.



- (4) The color and markings of the corolla.
- (5) The shape of the calyx lobe.
- (6) The color of the seed and its hairiness or baldness, and the relative length of its awn and plume.

If these directions are followed there will be no difficulty in identifying herbarium specimens of the plant. If the collector cannot make a sketch of the flower in water colors, an expanded flower may be immersed in vaseline in a bottle, and will then retain its colors until its arrival in England.

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### PERNAMBUCO JABORANDI.<sup>1</sup>

BY E. M. HOLMES, F. L. S.,

Curator of the Museum of the Pharmaceutical Society of Great Britain.

The leaves and fruits of the *Pernambuco jaborandi* were described and figured in the *Pharmaceutical Journal* eighteen years ago,<sup>2</sup> but until quite recently I was unable to obtain the inflorescence in good condition. At the time I pointed out that the plant was probably distinct from *Pilocarpus pennatifolius*, Lem., under which name the drug has been frequently described.<sup>3</sup> There is little doubt, however, that an inferior variety of *jaborandi*, said to be collected near Asuncion in Paraguay, is obtained from *P. pennatifolius*, since specimens of the fruit taken from the drug in commerce are similar in character, and the flowers are also of the dull purple color, like that of cultivated plants of *P. pennatifolius* in Mr. Thos. Hanbury's celebrated garden near Ventimiglia. The leaves also are thin, obovate, tapering at the base and the veins on the upper surface are not prominent.

Through the kindness of Mr. R. I. Lynch, F.L.S., Curator of the Botanic Gardens at Cambridge, I received last year a perfect inflorescence of the *Pernambuco* plant, which has been in cultivation both there and at Edinburgh for a few years. The inflorescence proved at once that the *Pernambuco* plant is a distinct species. The principal distinctive characters were pointed out at an evening meeting of the Society last year (*Pharm. Journ.* [3], vol. xxii, p. 875), but a

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<sup>1</sup> *Pharm. Jour. and Trans.*, June 10, 1893, p. 1008.

<sup>2</sup> *P. J.*, [3], vol. v, pp. 581-583.

<sup>3</sup> Benth. and Trimen, "Med. Plants," No. 48; "Bot. Mag." tab. 7235.

botanical description of the plant has not yet been published. This may now be given as follows:

*Pilocarpus* "*Faborandi*," n. sp., ramis erecto-patentibus, ramulis junioribus plus minusve puberulis; foliis alternis imparipinnatis; foliolis oppositis, fere 4-5 jugis, anguste ellipticis, coriaceis, rigidis, glanduloso-punctatis, long. 10-15 cm., lat.  $2\frac{1}{2}$ -5 cm., fere emarginatis, marginibusque, paululo recurvis, basi inæqualibus, in petiolum perbreve 5 mm. constitutis; floribus in racemum terminalem pedalem curvatum rachide gracili dispositis, sæpissime deciduis, pedicellis tenuibus, long.  $\frac{1}{2}$ -1 cm., roseis minute bracteolatis, bracteolis subulatis supra medium dispositis; calyce minuto, 5-angulari, non rite lobato; corolla rotata, petalis quinque, ovatis acutis, 1-nervis, pallidoluteis medio transverse roseo-suffusis; disco rugoso-crenato, glanduloso-punctato; staminibus quinque, filamentis compressis lineari-attenuatis, antheris innatis; ovario 5-carpellato; fructibus maturis paucis, carpellis convexis apice rotundatis transverse striatis, glanduloso-punctatis, seminibus in carpello singulis nigris nitidis.

Hab. Pernambuco; specimen cum floribus in Hort. Cantab. Angliæ cultis, a me solum visum.

The most marked features in this species are (1) the deciduous pinkish-yellow flowers with slender pink pedicels, (2) the less quadrate, larger, and more convex carpels, as compared with those of *P. pennatifolius*, Lem., (3) the more leathery leaflets, with elliptic outline, unequal base, and prominent veinlets on the upper surface, the leaflets being normally in four pairs.

As the leaves of *P. Faborandi* are known to yield more alkaloid than the Paraguay plant, the former only should be official. For pharmaceutical purposes the leaves may be described as follows:

Leaves coriaceous, elliptical, entire, emarginate, somewhat rigid, 10-15 cm. long by  $2\frac{1}{2}$ -5 broad tapering equally towards either end oblique at the base with the veinlets on the upper surface distinctly prominent.

## THE PRODUCTION AND USES OF ASBESTOS.

The *Journal de la Chambre de Commerce de Constantinople* says that the best asbestos comes from Siberia; it is also met with in the clefts of certain rocks in the Tyrol, in the Pyrenees, in the mountains of Hungary, in Greenland, Brazil, etc. The finest description comes

from Tarantaise, in Savoy, and forms filaments exceeding fifty centimetres in length. In the Alleghany and Appalachian mountains there are important beds of this mineral, and veins of it are frequently found about fifty centimetres in thickness. Canadian asbestos is also of a very superior quality. On the St. Francois river there is a bed sixteen hundred metres long and of unknown depth. In olden times asbestos was spun and made into table-cloths, serviettes, etc., which were cleaned by being passed through the fire, and this material was also used by the ancients to wrap around corpses before placing them on the funeral pile, in order that the ashes might not be mixed with the wood. In the Vatican Library, at Rome, an asbestos shroud can be seen which contains ashes and half-burnt bones, with which it was found in a sarcophagus. The ancients also made wicks for funeral lamps of the material. In modern times, asbestos has been used for firemen's clothing and for fire-proof paper. More recently, in America, its employment has greatly increased, and it is now used as a substitute for minium and caoutchouc, in connection with the machinery in steamboats and locomotives. Asbestos tissues, manufactured with pure amianthus yarn, are employed by the manufacturers of chemical products in filtering acids, and as wicks in certain heating apparatus. Asbestos mastic has an advantage over all known mastics, and resists the very highest temperature without injury. Asbestos colors are manufactured which, in the case of metals, form an excellent preventive of oxidation, and render wood and tissues absolutely incombustible. Bricks, made of very light and porous asbestos, are frequently placed in gas chimneys; the mineral reddens, and throws out a great heat. About twelve years ago not more than three or four articles, at the most, were made of asbestos, while, at the present day, the list contains more than a hundred, and the use of this article is extending everywhere. One of the uses to which asbestos is now put is in connection with ceramics, and the use of asbestos pottery is expected to become popular, and to spread. With asbestos powder a species of earthenware is manufactured, of which the results, from an industrial point of view, are very interesting. This earthenware has the peculiarity of possessing a grain of a fineness hitherto unattained by any china ware. Its color varies according to the treatment to which the asbestos has been subjected; it most frequently approaches that of terra cotta, and this

article unvarnished is used for the production of statuettes and other articles. On earthenware prepared from asbestos, enamel is easily applied, and, when finished, presents a very attractive appearance. Employed as filters for water, wine, beer, alcohol, etc., the results are superior to any obtained by other descriptions of earthenware. Uninjured by acids, they can be used for the strongest, and as insulators they are much superior to glass. Finally, as pipeclay, asbestos produces an excellent pipe, and it is said that no clay yet used with this object has produced so satisfactory a result from the smoker's point of view. It is only a very short time that asbestos earthenware and pottery has been known, and already its applications are found to be very numerous. Each day appears to find a new discovery in the quality of the ware and a new industrial application. As regards the method of preparation to which asbestos is subjected, particularly in Canada, the following is adopted: After having been examined, the blocks of asbestos are pounded in such a manner as not to break the fibres, and these latter are then submitted to the action of a species of sieve, in order to separate the long from the short fibres. The long fibres are treated almost in the same way as ordinary textiles, with this difference, that as they cannot be felted they must be subjected to a process of "concentration" before being spun. It is this that renders the manufacture of fine asbestos tissues extremely difficult.—*Journal of the Society of Arts.*

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## THE DECOMPOSITION OF CHLOROFORM.<sup>1</sup>

BY DR. CARL SCHACHT AND DR. E. BILTZ.

We have noticed with much satisfaction the report of the interesting paper read by Mr. David Brown, on the decomposition of chloroform, at an evening meeting of the Pharmaceutical Society in Edinburgh last March,<sup>2</sup> as it shows that attention is being directed to this important subject. We hope therefore that in communicating some particulars in regard to our own investigations of this subject, they may be received in a similar manner, and found useful in serving to explain some of the difficulties with which it is surrounded,

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<sup>1</sup> *Phar. Jour. and Trans.*, June 10, 1893, p. 1005.

<sup>2</sup> *Pharm. Jour.*, March 25, p. 792; *Amer. Jour. Phar.*, May, p. 241.



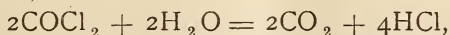
as well as the discordant opinions entertained respecting various observed features of the decomposition.

In the first place we desire to express our satisfaction at finding that in regard to certain leading facts there is complete agreement between Mr. Brown and ourselves, that in reality he has furnished further confirmation of the accuracy of our observations as recorded in the *Archiv der Pharm.* for 1867 and 1868 (see also *Amer. Jour. Phar.*, 1867, p. 72, and 1868, p. 289), and also of the general conclusion deduced from our investigations, that while chloroform is not decomposed by the action of sunlight in the absence of oxygen, it is so decomposed when oxygen is present, yielding as products, chlorine, carbon oxychloride (phosgene) and water. In regard to the ultimately recognizable results of this decomposition in particular instances there is, however, one circumstance which exercises an essential determining influence; but it is not always sufficiently considered, and this fact has given rise to differences of opinion as to the nature of the decomposition and of its products. Thus Professor Ramsay has put forth the opinion that the only products are carbon oxychloride and hydrochloric acid, whilst others maintain that in addition to the formation of those products there is also an elimination of chlorine in the free state.

We have no doubt that this difference of opinion is entirely due to want of attention to the presence of alcohol in the chloroform experimented with, and to misinterpretation of the chemical changes taking place. Whilst recognizing as correct the first two equations:



and



given by Mr. Brown to represent the decomposition, we think it necessary to add that those equations apply exclusively to the decomposition of chloroform that is perfectly free from alcohol.

Many years ago we succeeded in proving that the well-known influence of alcohol in preserving chloroform from decomposition is due to the alcohol taking up and chemically combining with the deleterious products resulting from the decomposition, so as to render them innocuous. More recently this fact has also been pointed out in the paper published by us on the preservation of

chloroform from decomposition by light.<sup>1</sup> Though the direct products of the decomposition of pure chloroform are only chlorine and carbon oxychloride, it is natural that in the case of chloroform containing alcohol the chlorine thus eliminated should act upon the alcohol present, and so give rise to the production of hydrochloric acid. Consequently, in the first stage of decomposition of chloroform containing alcohol, hydrochloric acid is always found in the place of free chlorine. That being the result, however minute the proportion of alcohol may be, it is evident that in such a case an observer who is not aware of the presence of alcohol in the chloroform will be led to dispute the statement that elimination of free chlorine is a primary feature of the alteration. For that reason we consider it to be absolutely necessary, in making experiments, to ascertain the nature of the decomposition of chloroform, either to make sure that the chloroform operated with is perfectly free from alcohol, or to determine how much is present, and to take that into account when interpreting the observed results.

As we have found that sufficient attention is not generally given to this point and to the purity of the chloroform experimented with, we desire to point out the following facts:

Chloroform cannot be absolutely deprived of alcohol in any other way than by repeatedly shaking it with double its volume of fresh water. This operation should be repeated at least ten times.

To ascertain the entire absence of alcohol it is necessary to have recourse to the well-known iodoform test, or to test the chloroform with a solution of potassium bichromate exactly in the manner we have described,<sup>2</sup> any stronger solution being unsuitable for the purpose.

Chloroform quite free from alcohol has the specific gravity 1.502 at 15° C. (59° F.), and its boiling point is 62.05° C. (143.7° F.) at 760 mm.

Such chloroform when exposed to daylight of sufficient power, will begin to decompose within one or two hours. But it must be remembered that the chemical intensity of daylight varies considerably at different times. In summer it is, on an average, ten times as powerful as in winter, and even in summer time days of

<sup>1</sup> *Pharm. Journ.* [3], xxii, 1041, and "Month," 691; *Am. Jour. Pharm.*, 1892, p. 391.

<sup>2</sup> *Archiv der Pharmacie*, 1868, vol. 134, p. 208; *Pharm. Journ.* [3], xxii, 1041.

feeble intensity occur. Consequently the effects produced will vary, and chloroform which in one experiment is found to show decomposition within two hours may at another time require to be exposed for a whole day to full sunlight before it shows the first signs of decomposition. The disappointment arising from frequent failure to arrive at definite results from such experiments may be attributed either to the underrating of these differences in the chemical activity of sunlight or to the circumstance that the influence of even the most minute proportion of alcohol is disregarded. If the investigators of the Pictet chloroform had paid attention to the presence of minute traces of alcohol, or had they been aware of the importance to be attached to them and the means for their detection, they would have avoided the disproof of their statement as to the exceptional durability of the Pictet chloroform. From the first announcement that this chloroform had been experimentally proved to possess a capability of resisting the influence of sunlight for four days we drew the conclusion that it contained alcohol, and our prediction that such was the case, without even having seen a sample, ultimately proved to be correct.

Mr. Brown's statements as to the nature of the products of the decomposition of chloroform are quite correct. These products may be easily recognized, the chloride by means of zinc iodide and starch, the carbon oxychloride by its peculiar nauseous smell, distinctly different from that of chlorine. If it be needed there is a much better mode of testing for carbon oxychloride than by the baryta water test recommended by Professor Ramsay, viz: shaking the decomposed chloroform with mercury, which immediately combines with the free chlorine, but does not act upon the carbon oxychloride, and thus the peculiar smell of this body becomes more easily recognizable. The presence of free chlorine is sufficiently indicated by the coloration of moistened test paper charged with zinc iodide and starch when it is immersed in the atmosphere of the bottle, also by the bleaching of moistened litmus paper. After the removal of free chlorine by agitation with mercury, litmus paper is no longer bleached, but is then reddened, since the water in the paper determines decomposition of carbon oxychloride with production of hydrochloric acid and carbonic anhydride. Before the removal of the free chlorine this reddening of moistened litmus paper is masked by the bleaching action of the free chlorine.

We have not hitherto observed the formation of a straw-colored supernatant liquid in the decomposition of chloroform, as described by Mr. Brown in his paper.

As is now well known, the decomposition of chloroform is prevented by an addition of alcohol, and not only does such an addition stop decomposition that has already commenced, but it will, with sufficient shaking, remove the free chlorine that has been eliminated, as well as the carbon oxychloride formed. The amount of alcohol requisite for that purpose depends upon the extent to which decomposition has advanced, and hence it will be seen that the length of time during which alcohol will protect chloroform will always be proportionate to the amount of alcohol added. So soon as the alcohol is consumed, by the joint action of the free chlorine and the carbon oxychloride directly resulting from decomposition of chloroform, the products of the change that has gone on up to that point without injurious consequences become all at once recognizable, just as if the alteration had suddenly commenced. At that point the presence of free chlorine and carbon oxychloride—the initial products of the decomposition—can be detected. Moreover, since hydrochloric acid will also have been formed by the subsequent reaction of the free chlorine with alcohol, that acid will also become recognizable as soon as the last trace of alcohol disappears, though it will at first be dissolved by the alcohol present. These successive changes afford an explanation of the fact that alcoholic chloroform will in the first instance evolve hydrochloric acid, originating indirectly from the reaction of chlorine with alcohol, and soon afterwards free chlorine and carbon oxychloride originating directly from the decomposition of chloroform. The decomposition of pure chloroform, on the contrary, commences by giving rise at once to the products shown in the equation given by Mr. Brown, which coincides exactly with the one that was given by ourselves in the paper above referred to.

According to our own experience an addition of alcohol, amounting to one part in four hundred of chloroform (0.25 per cent.), is sufficient to prevent recognizable decomposition for one month or longer, with double that amount (0.5 per cent.), decomposition is prevented for nearly a year, and with one per cent. for many years. These, however, are only average statements, liable to variation in both directions, according to the effects produced



by the varying intensity of daylight, as, indeed, Mr. Dott states that he has found to be the case in regard to chloroform of 1.498 sp. gr.

The amount of alcohol present in any sample of chloroform may be inferred with accuracy from the specific gravity of the sample in question, but as alcohol does not reduce the gravity in exact arithmetical ratio to its amount, we have found it necessary to determine the specific gravity of known mixtures of absolute alcohol and chloroform. In that way we have obtained the following data :

					Specific gravity at 15° C. = 59° F.
Pure chloroform	.	.	.	.	1.5020
"	"	with 0.25 p. c. alcohol	.	.	1.4977
"	"	" 0.5 "	"	"	1.4939
"	"	" 1.0 "	"	"	1.4854
"	"	" 2.0 "	"	"	1.4705

According to these data the chloroform of 1.5 sp. gr. operated upon by Mr. Brown (see *ante*, p. 792) would have contained  $\frac{1}{800}$  of absolute alcohol (provided its specific gravity was determined at 59° F.), an amount which is in close correspondence with the observed retardation of its decomposition under the influence of oxygen and sunlight.

In reference to the interesting fact of the accelerated decomposition of chloroform in an atmosphere of pure oxygen, we are disposed to ascribe that result to the absence of the nitrogen with which oxygen is mixed in ordinary atmospheric air. At one time we entertained the idea that ozonization of the oxygen in contact with chloroform and under the influence of sunlight might have something to do with the decomposition, but that was during the earlier period of our investigations, and the experiments made in reference to this point during 1868 showed that no ozonization takes place.

In conclusion, we agree with Mr. Brown's opinion that the gradual disappearance of free chlorine when chloroform is undergoing decomposition is a sign of its further action upon the chloroform, producing hydrochloric acid and altering the relative proportions of carbon oxychloride and hydrochloric acid so as to increase the latter.

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**Magnesium sulphate**, according to Dr. Suckling, administered as a purgative to the mother, also causes looseness in the nursling, while senna cascara and aloes rarely affect the child's bowels.

ALBUMOSES AND PEPTONE.<sup>1</sup>

BY W. KÜHNE.

Solutions containing a mixture of albumoses and peptone give a precipitate of albumoses when saturated with ammonium sulphate, the peptone remaining in solution. After filtration, the filtrate, if set aside, will subsequently give a further precipitate if more salt is added. This has been explained by supposing that the saturation was in the first instance incomplete, or that the peptone is partially changed back into albumose. The present research shows that the former is the more probable explanation. There are many precautions necessary, in order to precipitate the last traces of albumose. It is necessary in the first instance to use large volumes of the saturated solution in addition to merely adding crystals of the salt to the proteid mixture. Further, it is found that whereas the greater part of the albumose is precipitated by the salt if the reaction of the mixture is made acid, the residue which is difficult of precipitation comes down more readily if the reaction is made alkaline. It is further necessary after the solution of peptone is obtained to remove the salt employed; a method for doing this by the use of barium carbonate after concentration is fully described. If pancreatic juice has been used for the preparation of peptone, care also must be taken that leucine and tyrosine are removed also. In drying, concentrating, etc., especially if sulphuric acid is used, a brownish product is formed; this is minimized by care in the manipulations. This substance is precipitable by ammonium sulphate, it is not, however, albumose; it gives no biuret reaction. Further, if a precipitate forms in dialysis, it is not necessarily of proteid nature; if hard water is used, it may be calcium sulphate.

Pekelharing does not seem to have noticed the necessity of these and other precautions and details, and much of the present paper is polemical, showing Pekelharing's supposed errors, and pointing out that there are more differences between peptones and albumoses than a mere difference of solubility in ammonium sulphate.

*Diffusibility of Albumoses and Peptone.*—Hetero-albumose is the least diffusible of the albumoses; in neutral saline solutions it is precipitated, and there is no loss in dialysis. Dissolved in ammonia it loses 5.22 per cent. Deutero-albumose comes next (loss 24.1 per

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<sup>1</sup> *Zeit. Biol.*, 29, 1-40; *Jour. Chem. Soc.*, Abst. I, 233.

cent.); then proto-albumose (loss 28.3 per cent). Peptone loses 51 to 51.8 per cent.

Koch's tuberculin contains an indole-like substance in addition to albumoses (small quantities of proto-albumose, large quantities of deuterio-albumose). In the process of the action of the tubercle, bacillus, proto-albumose is first formed, then deuterio-albumose. The bacteria so far act like digestive ferments, but there is little or no true peptone formed; and leucine and tyrosine are also absent. Tuberculin also gives a color with bromine; this substance, tryptophan, or proteinchromogen, is probably a mixture of the indole-like substance with other not fully recognized materials.

The hay bacillus acts somewhat differently when grown in solutions of proto-albumose, for not only are secondary albumoses formed, but also true peptone, tyrosine, leucine, tryptophan and ammonia. It is thus very like trypsin in its action.

With *Bacillus prodigiosus* very little albumose remains; it is almost entirely broken up into peptone, leucine, tyrosine, tryptophan, and the indole-yielding substance.

In no case was there any formation of hydrogen sulphide.

## CHEMICAL CONSTITUTION OF PEPTONES.<sup>1</sup>

By P. SCHÜTZENBERGER.

Fibrin peptone, obtained from the blood of the horse in the manner previously described, is evidently not homogeneous. If a somewhat syrupy solution obtained by concentration on a water-bath is mixed with gradually increasing quantities of strong alcohol, precipitates are obtained which are more and more soluble in alcohol. About one-fifth of the fibrin peptone remains in solution, even when the liquid contains from 85 to 90 per cent. of alcohol. The composition of the various fractions is not identical, but indicates that they are probably different terms in a homologous series. The first precipitate has the composition  $C_{29}H_{51}N_8O_{13}$ , whilst the mean composition of all the fractions is  $C_{31}H_{55}N_8O_{13}$ . The portion soluble in alcohol has the composition  $C_{30}H_{56}N_8O_{13}$ . The various fractions, when heated for four or five hours at 180° with 3 parts of barium hydroxide, all behave like fibrin peptone and yield ammonia, carbonic anhydride, acetic acid, and a non-volatile residue consisting of a

<sup>1</sup> *Compt. rend.*, **115**, 764-768; *Jour. Chem. Soc.*, Abst. I, 235.

mixture of amido-acids. This residue, in all cases, when dried in a vacuum at the ordinary temperature, has the composition  $mC_9H_{18}N_2O_5$ ; if heated at  $100^\circ$ , it loses water. The similar residue obtained from the fraction soluble in alcohol has the composition  $mC_9H_{20}N_2O_5$ .

Phosphotungstic acid, free from alkalis, precipitates only about half the fibrin peptone. The precipitated fraction, when separated from the phosphotungstic acid and dried in a vacuum over sulphuric acid, is a colorless, friable substance, soluble in water but not hygroscopic. It contains oxygen and nitrogen in the ratio of 1.27 : 1, and carbon and hydrogen in the ratio of about 1 : 1.9. When heated with barium hydroxide, it loses about one-fourth of its nitrogen in the form of ammonia and 1 mol. of carbonic anhydride is liberated for every 2 mols. of ammonia. The residue of amido-acids has the composition  $p(C_nH_{2n}N_2O_4)$  or  $C_mH_{2m}NO_2$ ,  $n$  being between 9 and 10 and very near 9.

The portion not precipitated by phosphotungstic acid contains oxygen and nitrogen in the ratio of 2 : 1, and carbon and hydrogen in the ratio of 1 : 1.7. When heated with barium hydroxide, it loses one-fifth of its nitrogen in the form of ammonia. 1 mol. of carbonic anhydride is formed for every 2 mols. of ammonia, and the other products are acetic acid and a residue of amido-acids of the composition  $p(C_nH_{2n}N_2O_6)$  where  $n$  is again between 9 and 10 and is very near 9.

The portion of the fibrin peptone soluble in alcohol gives similar results except that it contains  $C_nH_{2n+2}$  instead of  $C_nH_{2n}$ .

It follows that fibrin peptone from the horse can be split up into two parts by the action of phosphotungstic acid, one which is precipitated and contains a lower proportion of oxygen, and another which is not precipitated and contains a higher proportion of oxygen. The excess of oxygen in the latter exists in the form of hydroxyl, and the fibrin itself must be regarded as a compound either hydrolysable by pepsin, yielding two products which are both ureides.

## THE FLASH-POINT AND POINT OF DANGER IN MINERAL OILS.<sup>1</sup>

BY D. R. STEUART, F.I.C., F.C.S.

The danger of fire or explosion from a mineral oil is tested by taking its flash-point. The Government test of Professor Abel is a

<sup>1</sup> Chemical News, June 23, 1893, p. 291.



2-inch cup covered on the top. The filling, heating, light applied, etc., are all defined. Holes are opened in the lid for a moment to apply the light at specified intervals, and the point got is very definite. The question is: What relation has the point so got to the point of danger? Is the Abel flash-point itself the point of danger, or is danger to be feared only at a much higher temperature?

Before a Parliamentary Committee some years ago, a witness said there was no danger at all until the temperature of the American fire test. The flash-point is the lowest temperature at which the vapors and air give a little explosion when the light is applied, going instantly out. The fire-point is the lowest temperature at which the vapors burn continuously.

A particular sample of oil I tested flashed in Abel test at  $78^{\circ}$  F., in the old Government open test at  $105^{\circ}$ , and fired in the old Government open test apparatus at  $122^{\circ}$ . This last is something like the American fire test. Is there, with this oil, no danger of fire in a store or explosion in a lamp until about  $120^{\circ}$  F. is reached?

A moment's thought will satisfy us that although a little cup of oil cannot supply sufficient vapor to keep up a constant flame until  $122^{\circ}$  F. is reached, a larger surface will supply vapor, and, when ignited, heat enough to produce a constant flame at a much lower temperature. I tried the oil mentioned above in an apparatus like the old Government open test, with screen around and partly also on the top, but 9 inches in diameter. Applying a small flame every  $2^{\circ}$  at a half-inch above the surface, the oil ignited explosively at  $88^{\circ}$ , and continued to burn furiously. Repeating the experiment, and applying the flame at every degree, it ignited and burned continuously at  $87^{\circ}$ , and the flame rapidly increased in vigor. Making the same apparatus a close test like Abel's, the oil ignited and fired (burned continuously) at  $76^{\circ}$  F.; that is, with a 9-inch wide closed test, instead of the 2-inch prescribed by act of Parliament, the oil not only flashed but fired  $2^{\circ}$  below the flash point Abel's test, and when open it fired only  $9^{\circ}$  above the Abel test. With a wider surface of oil, the flashing and firing would no doubt take place at even a lower temperature. These experiments prove, if they require proving at this time of day, that the old Government open test and the American fire test are altogether deceptive, and that in store, barrel or tin can, the flash-point Abel test is a point of real danger, and that for oil in large masses the danger begins even

below the flash-point (Abel). The experiments also prove that, except for very small surfaces of oil, the flash-point and the fire-point are the same.

The following happened in my experience :

A large tank of very high flashing oil was being pumped into, and the oil therefore in considerable commotion. The temperature was far below the flash-point in Abel cup; nevertheless, vapors were evolved and filled the top of the tank, and expelled by the rising oil, overflowed out at a manhole door on the top, which was not quite close, and ignited at a lamp some distance below. The fire ran up the stream of vapor; there was an explosion, blowing off the top of the tank, and the oil caught fire and burned uncontrollably until it was practically all consumed. For danger in oil works, even the Abel flash-point is deceptively high. Is it because this has not been realized that fires in oil works have been so frequent?

In regard to danger in a lamp, in 1872, before a Select Parliamentary Committee, a chemical expert said: "We have made a great number of experiments to ascertain whether oils which flash at 100° (equivalent to 73° Abel test) or even a little below 100°, can by any contrivance be exploded in a lamp, and we cannot do it: whether by electric spark or flame of any kind, but we cannot fire it; that we have ascertained to be a fact." Now, the real fact is that a lamp filled with oil of 100° old open test, if shaken up—as by carrying the lamp—can be exploded with electric spark quite easily, even at 73°. The explosion is not violent; but at 5° above the flash-point (Abel) the explosion may be very violent. Such an oil can explode violently at any temperature between 78° and 120°; that is, at all temperatures lamps are generally exposed to. For lamps burning heat up the oil, more with large lamps than with small, more with metal lamps than with porcelain, more if with metal safety tubes than without, and more with flat burners than with central draught. As all ordinary lamps are more than two inches wide, the flash-point in them will be the Abel flash-point, or a little lower. There is a little danger even at the Abel flash-point, for although the explosion at that temperature is a mere puff, yet if it happened while the lamp was being carried it might cause it to be thrown down on combustible material. At any rate, at 5° above the Abel flash-point the danger is very great.

I have tried many experiments oversetting cheap gas lamps when

burning so as to break them. I had the lamp half filled with oil and heated to certain definite temperatures. At  $5^{\circ}$  above the flash-point (Abel) all in general went out. At  $10^{\circ}$  above flash point with some low flashing ( $73^{\circ}$  to  $78^{\circ}$ ), petroleum ignited and burned vigorously, and some merely flashed and went out. High flashing oils ( $100^{\circ}$  to  $110^{\circ}$  Abel),  $10^{\circ}$  above flash-point invariably went out or merely flashed; they never permanently ignited. At  $15^{\circ}$  above the flash-point the high flashing oils inflamed, but burned quietly, and the fire could easily have been commanded. So low flashing oils may be a great danger if overset at  $10^{\circ}$  above flash-point; but high flashing oils are not in great danger until  $15^{\circ}$  over flash-point or more; that is, if overset on an ordinary floor. If overset on easily combustible materials, there is great danger, even at the flash-point, and as the absence of combustible materials cannot be depended on, even for this kind of accident, the flash-point (Abel) becomes the point of danger. If an open cup of oil heated to the flash-point (Abel) has a large lighted candle plunged into it, the candle is extinguished just as by water. These experiments show the freedom from danger in lamp, or in any small quantities, and particularly of high flashing oil, if kept several degrees under the Abel flash-point.

High flashing oils burn practically as coolly as low flashing oils, and if we seek safety by using a high flashing oil we are not running into any other danger.

Coroner's inquests are very frequent on lamp accidents. It has become the custom for the inspectors to state that no dangerous oil is now imported into England, and inspector and coroner put the whole blame on the lamp. But surely no scientific man is free to state that  $73^{\circ}$  flashing oil is safe in our climate. It is often  $80^{\circ}$  or over it in houses, and all the year round the temperature in ordinary lamps is  $80^{\circ}$  to  $90^{\circ}$ . The danger is not a mere matter of opinion, but an easily ascertainable scientific fact; and when a scientific man makes such a statement regarding a matter involving hundreds of deaths in England every year, I think he should somehow be amenable to the ban of the profession, if to nothing else. It is absurd to condemn the poor for not having safety lamps; besides, even if they had them, they are only an extra source of danger, unless in proper order, and with cheap lamps and ignorant people that could not be depended on.

It is obvious to common sense that the poor should be supplied with oil, such as the rich supply themselves with, safe to work with at ordinary temperatures, and perfectly safe from danger of explosion in ordinary lamps properly attended to. With ordinary petroleum there are many real lamp explosions, in spite of all that is said to the contrary. Carry the lamp about, attempt to blow it out, or turn down the wick too far, and the lamp explodes. These could never happen with an oil whose flash is a few degrees above the temperature of the oil in the lamp. Lamp fatalities are so dreadful that one would think that a few would waken up the people so as to get the matter put right; but the deadly tale goes on day by day, but it is among the very poor, and nobody seems to care. The Government, contrary to the example of all other civilized countries, has given what is practically a certificate of safety for oils flashing above  $73^{\circ}$ , and, instead of protecting us, has, by legislation, shut itself out from the power of interfering. So these dangerous oils can be stored in any quantity anywhere. Store proprietors and railway companies exercise great care; nevertheless, our lives are at the mercy of the idiosyncrasy of individuals, and we may expect a catastrophe on the grand scale some day.

In the past, nobody took any interest in the petroleum laws except the representatives of the oil trade. It is time scientific men for the sake of the voiceless poor, should pay some attention to the matter. The science put before the Parliamentary Committee was sometimes of a strange kind, and matters of fact were treated as matters of opinion instead of being settled by experiment. It is evident the Government does not know that the flash-point (Abel) is in all cases a point of real danger, and in stores and tanks of great danger. They evidently think there is no danger until the temperature of the old open test. They would never have lowered the safety point from  $100^{\circ}$  to  $73^{\circ}$  if they had known that the old test was deceptive by that interval—and they ought to have known.

Oil vapors, when hot, as in the old open test, diffuse away pretty rapidly, but when cold, as in a store, they are very heavy, roll along to the lowest point, and if there are no air currents, diffuse away very slowly. They can be decanted from vessel to vessel like carbonic acid gas; but this the Government officials are ignorant of, and think that oil vapors diffuse rapidly into the atmosphere like coal gas.



## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

*The Alabama Pharmaceutical Association* met, in its 12th annual convention, at Blount Springs, May 9. Several addresses were delivered, a number of papers read at the various sessions and the Association adjourned, to meet again at Anniston, on the second Tuesday in May, 1894. The newly elected officers are: President, E. P. Galt, Selma; secretary, P. C. Candidus, and treasurer, E. B. Norton.

*The Arkansas Association of Pharmacists* held its eleventh annual convention in Little Rock, May 16, President Morton in the chair. The sessions were taken up by the usual routine business, addresses, reports and papers. The officers elected for the ensuing year are: G. N. Hart, Pine Bluff, president; J. W. Beidelman, Little Rock, secretary, and J. A. Jungkind, treasurer. The next annual meeting will take place in Little Rock, the date to be announced hereafter.

*The Delaware Pharmaceutical Association* met in seventh annual convention at Wilmington, May 4, president N. B. Danforth in the chair. The usual routine business was transacted, and president N. B. Danforth, secretary John M. Harvey and treasurer J. J. Gallagher were all re-elected to serve another year. The association will again meet at Wilmington next year.

*The Florida State Pharmaceutical Association* met in its seventh annual meeting at the Placide Hotel, Pensacola, president N. Wooldridge in the chair, and was welcomed by the Mayor, Dr. H. Robinson. A large share of the proceedings was taken up with discussions on the cutting of prices, and the Association approved the platform of the Interstate Retail Druggists' League. The officers elected are: President, T. S. Chalker, Lake City; secretary, W. H. Lightstone, Jacksonville; treasurer, Ed. Delouest, Ocala. Next year the Association will meet in Tampa, on the third Wednesday in May; S. B. Leonardi is the local secretary.

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## EDITORIAL.

*Legislation against adulteration.*—A bill introduced by Mr. Hewit was finally passed by the Legislature of Pennsylvania, having for its object the prevention of "the adulteration of drugs, food and spirituous, fermented or malt liquors in the State of Pennsylvania." The definitions of the terms food, drugs and adulteration are practically identical with those contained in the national adulteration bill, proposed in 1890 (see Amer. Jour. Phar., 1890, p. 312). Provision has been made for the appointment of public analysts, microscopists and chemists, and for the procuring of samples from manufacturers or dealers, under the supervision of the State Board of Health, who were also empowered to declare certain articles or preparations to be exempt from the provisions of this act. The sale of arsenic, strychnine, corrosive sublimate and prussic acid, without the written prescription of a regular physician, was prohibited, and 24 articles or groups of articles are especially enumerated, together with their admixtures or adulterations, as embraced within the provisions of the penalty of Section I, viz: not exceeding \$500 for the first offence, and \$1,000 or imprisonment for one year or both for each subsequent offence, and in addition a penalty of \$100 for each offence on complaint of a citizen, one-half to go to the prosecutor and the balance to the county.

The act has been vetoed by Governor Pattison, June 19, and it will be of interest to place on record the reasons for the disapproval of a law which deals with an important subject, that has nowhere been solved to the satisfaction of all concerned, leaving out of consideration the parties who practise and derive pecuniary profit from adulteration. The Governor states :

"This is a most elaborate, far-reaching and radical act. Possibly, upon the whole, its purposes are good and in the interest of public health and sanitation. But new and radical attempts, such as this, to interfere with the domestic life and private affairs of the people should always be hedged about with ample safeguards and protection against the needless invasion of popular rights. Official inspection of every article of food or drink by man is such an attempt to regulate and control business and domestic life and to interfere with the rights of the citizen, that it must be carefully scrutinized, lest it not only work immediate oppression and wrong, but promote duplicity, encourage fraud and evoke such resistance as would effectually defeat all its sanitary purposes.

"Besides many other things, this bill enacts that there shall be no genuine beer except it be made 'from barley and hops,' and that 'all substitutes shall be considered adulterations, and be under the penalty of the law, even if not deleterious to health.' Why one class of the manufacturers of drink should have specified to them by the Legislature the particular ingredients of their product, and should be confined to them under the penalty of the law, even if some other ingredients may be 'not deleterious to health,' it is impossible to conceive upon any honest theory which should control or construe public legislation.

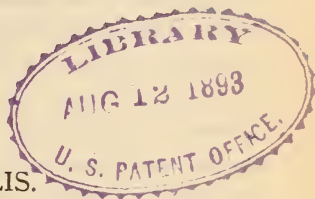
"The enactment in one line of this bill, that all substitutes for barley and hops shall be under the penalty of the law, and in the next line that beer, if made of other ingredients not noxious to health, shall be so labelled, seem to be wholly inconsistent. Moreover, no legislation of this character can affect or regulate the inter-State traffic in beer, the product of breweries situated outside of our Commonwealth, and such ruthless discrimination against a large class of our own manufacturers seems to have been short-sighted and ill-considered.

"Section 9 of the Act of May 24, 1887, to regulate pharmacy, amended by the act of June 10, 1891, provides against the falsification or adulteration of drugs or medical substances, and the attempt to repeal it by Section 14 of the bill under consideration would, in all probability, work evil and confusion. I believe that something may be done in a general way towards the prevention of adulteration and imposition in articles of food and drink, but such legislation must be undertaken with great caution. It should be the subject of careful study by the regularly-constituted health authorities of the State, and ought to have their approval before submission to the Legislature. \*

"I am satisfied the bill before me is not only not such a measure as would recommend itself to popular approval and secure the moral support which all sound laws should be able to gather to themselves, but that, in the main, it would work far more harm than good. The people of the Commonwealth can better afford to wait for the enactment of a more carefully drawn law than to submit to the evils which would attend the enforcement of this one."

# THE AMERICAN JOURNAL OF PHARMACY.

AUGUST, 1893.



## NARCISSUS ORIENTALIS.

By LOUIS ROBECHER, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 126.

Natural order Amaryllidaceæ. Habitat, Eastern Asia.

This winter blooming plant, popularly known as the "Chinese Lily" or "Flower of the Gods," has apparently been introduced by the Chinese, and is much sought after as a house plant from November to March.

It flourishes best when planted in a dish of pebbles with water just reaching the roots. Under these conditions it will bloom in about twenty-five days. If planted in half sand and half pebbles it is said to require about ten days longer. The only advantage derived from this latter method is that the seeds will then mature.

A few years ago these bulbs could only be obtained in Chinese stores, at a somewhat extravagant price, varying from fifty cents to one dollar each. Now they can be had of every seedsman at less than that price per dozen, or at from five to ten cents each.

A partial examination of the moist drug gave 52 per cent. of moisture, 3 per cent. of ash, 9.5 per cent. of mucilage, 3 per cent. of sugar and small quantities of resin, pectin, alkaloid and glucoside. There remained about 7 per cent. of lignin and 16.6 per cent. of cellulose.

The glucoside was separated from the bulb by extracting with alcohol, recovering the latter by distillation, dissolving the residue in acidulated water, and agitating the filtered solution with a mixture of ether and chloroform. On evaporation of this mixture, the

glucoside was left in a crystalline condition. When it was dissolved in water and heated with Fehling's solution, the latter was reduced. Sulphuric acid colored it reddish-brown, nitric acid turned it yellow.

Several hundred grams of the bulbs were extracted and the proportion of the glucoside found to be about two-tenths per cent.

The alkaloid was prepared by using the acid solution, from which the glucoside had been extracted by agitation with ether and chloroform. This acid solution was rendered alkaline with sodium hydrate and then agitated with chloroform. On evaporation of the latter, the alkaloid was deposited in colorless acicular crystals. These crystals, when heated on a platinum foil, melted to a bright red liquid, and then completely volatilized. When heated, with soda lime the odor of ammonia was given off. Concentrated sulphuric acid colored the crystals dark brown. An acid solution of the alkaloid gave precipitates with most of the alkaloidal reagents.

About two one-hundredths per cent. of the alkaloid were found in the moist bulbs. The dry drug yielded proportionately a much smaller quantity of the active principles, no doubt because of their decomposition from the heat employed.

These principles were also prepared by extracting the moist bulbs with acidulated water, and agitating this liquid with ether and chloroform as in the preceding case, but the mucilage present rendered the successful agitation with solvents almost impossible on account of the formation of an emulsion, which required a long time to separate.

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### HYDRASTIS CANADENSIS.<sup>1</sup>

BY F. A. THOMPSON, Detroit, Mich.

Golden Seal, introduced to the medical profession about forty years ago by the Eclectics, has become one of the leading drugs of the *Materia Medica*, and for a complete Botanical, Medical and Pharmaceutical history, consult *Drugs and Medicines of North America*. It is my intention with this paper not to discuss the various constituents of this drug as to their characteristic reactions, or make a special study of them, but to present briefly the results obtained in assaying the drug, ground ready for manufacture of galenical preparations, and several fluid extracts made by the leading manufacturing pharmacists.

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<sup>1</sup> Read before Michigan State Pharm. Ass'n, St. Clair Flats, June, 1893.



Golden Seal contains three alkaloids, namely, berberine,  $C_{20}H_1NO_4$ ; hydrastine,  $C_{21}H_{21}NO_6$ , and canadine,  $C_{21}H_{21}NO_4$ , the latter having been in dispute for some time, and its presence but recently established by F. Wilhelm and E. Schmidt. Canadine is present, however, in but small quantities and, therefore, may be ignored in the estimation of berberine and hydrastine. The most important constituent of this drug is its *hydrastine* based on the medical reports, and it is this on which we are to judge of the quality of the drug or any preparation made from it.

#### ASSAY OF THE DRUG.

Ten grams of the drug in a moderately fine powder is exhausted with strong alcohol by hot re-percolation, requiring 2 or 3 hours, percolate cooled and diluted to 100 cc. with same menstruum, 25 cc. of this tincture is placed in a suitable flask, 1.3 cc. HCl, U. S. P., 0.2 cc.  $H_2SO_4$ , and 12.5 cc. concentrated ether added and the mixture allowed to stand 24 hours in a cool place, with frequent shaking. At the end of this time transfer the crystals to counterpoised filter papers, washing them with a mixture of equal volume of concentrated ether and strong alcohol until filtrate gives no acid reaction. Dry crystals at  $105^\circ C.$ , weigh, and multiply weight by 0.9017 to obtain the amount of berberine alkaloid, and then multiply this result by 40 to ascertain the percentage.

The filtrate from berberine estimation is rendered nearly neutral, evaporated to a small volume, solution cooled and transferred to a separator and the residue remaining in evaporating dish is thoroughly washed with slightly acidulated water till, free from alkaloid, the washings added to the separator. Render fluid alkaline with ammonia water and extract the alkaloid with several portions of chloroform, evaporating the chloroformic solution to dryness at a low heat, protected from light. Redissolve in acid water, transfer to 2 oz. prescription vial, wash with ether, rejecting the same. Reprecipitate alkaloid with ammonia water and extract with several portions of ether. Evaporate the ethereal solutions in a shallow crystallizing dish. Now dissolve the residue in 10 cc.  $\frac{n}{20} H_2SO_4$  (a small amount of ether facilitates the solution of the alkaloids) add 20 or 30 cc. water, 2 drops of cochineal tincture 1:10 and determine the free acid by titration with N-100 sodium hydrate solution. Each cc. of N-100  $H_2SO_4$  neutralized

by the alkaloid represents 0.00383 gram hydrastine and this amount multiplied by 40 equals the percentage in the drug. In all my results here, I have worked duplicate assays and have also tried several duplicate assays for the hydrastine by the following modifications which have given equal results, and being much shorter, feel confident that it will prove the better method of the two. It is as follows:

After neutralizing filtrate from berberine estimation and reducing to a small volume, it is mixed with 8 or 10 grams of sawdust (formerly treated with acid water and alcohol to remove extractive matter), the mixture dried, placed in a suitable 4 oz. flask or bottle and 100 cc. of modified Prollius mixture<sup>1</sup> added. After macerating several hours, with frequent shaking, 50 cc. of the clear ethereal fluid is transferred to a beaker, evaporated to dryness at a low temperature, redissolved in acid water and ether, and transferred to a 2 oz. prescription vial and, from this step on, treated the same as in the other process.

## EXAMINATION OF GROUND DRUG.

NUMBER.	Per cent. berberine calculated from dried (105° C.) berb. muriate.	Per cent. Hydrastine by weight.	Per cent. hydrastine by titration with N-100 H <sub>2</sub> SO <sub>4</sub> .
1, . . . . .	3.3	2.0	1.76
2, . . . . .	4.15	2.8	2.50
3, . . . . .	3.13	2.52	2.3
4, . . . . .	3.24	2.32	2.1
5, . . . . .	3.48	2.7	2.5
6, . . . . .	3.89	2.48	2.25
7, . . . . .	4.06	2.8	2.5
8, . . . . .	3.0	2.3	2.18
9, . . . . .	3.1	2.3	2.16
Average, . . . .	3.48	2.47	2.27

The above results are much higher in the berberine and hydrastine than any recorded. Lloyd reports in *Drugs and Medicines* of

<sup>1</sup> Ether, . . . . .	cc. 250
Chloroform, . . . . .	100
Alcohol, . . . . .	25
Conc. Ammonia, . . . . .	10

North America, a practical manufacturing yield of 1·8 per cent. mono-sulphate of berberine, equivalent to 1·39 per cent. berberine alkaloid, and hydrastine crystals from 0·25 to 1 per cent. A yield of 3 to 3·5 berberine muriate can be readily obtained on a practical scale, also a much larger amount of hydrastine, having obtained 3·6 grams of beautiful white crystals from 200 grams of drug or 1·8 per cent.

FLUID EXTRACT GOLDEN SEAL U. S. P. AND WITHOUT ALCOHOL.

*Assay.*—10 cc. of either preparation is placed in a 100 cc. graduated flask, about 75 cc. of alcohol is added and the mixture digested on a water-bath for 20 or 30 minutes. After cooling, sufficient alcohol is added to dilute to 100 cc. This alcoholic solution is then treated the same as the tincture obtained in the assay of the drug.

EXAMINATION OF FLUID EXTRACT GOLDEN SEAL, U. S. P.

NUMBER.	Per cent. berb. calcu. from dried (105° C.) berb. muriate.	Hydrastine by weight.	Hydrastine by titration with N-100H <sub>2</sub> SO <sub>4</sub> .
1, . . . . .	2·13	2·2	1·96
2, . . . . .	2·7	—	2·5
3, . . . . .	1·88	1·36	1·22
4, . . . . .	2·52	1·98	1·87
5, . . . . .	2·52	—	2·45
6, . . . . .	1·73	1·3	1·16
7, . . . . .	1·89	1·74	1·62
Average, . . . .	2·20	1·71	1·82

The above fluids represent the leading manufactures. Van Ledden Hulsebosch, Amsterdam (*Pharm. Weekblad*, Mar. 21, 1891), reports a yield of 3·43, 2·34 and 3·63 of berberine and 2·14 and 1·71 per cent. hydrastine (by weight) in three different lots of fluid extract of his own make, and 1·86 and 2·71 per cent. berberine and 1·46 and 1·74 per cent. hydrastine, in two samples made by other pharmacists. L. van Itallie, Amsterdam (*Pharm. Weekblad*, Apr. 4, 1891), found in various fluid extracts of hydrastis, 2·21, 2·52, 1·42 and 1·79 per cent. hydrastine, by weight. The above results on hydrastine by weight would necessarily be higher than those

obtained by titration with volumetric acid solution, due to some impurity present in the alkaloid. A standard fluid extract should contain not less than 2 per cent. hydrastine, based on titration with volumetric acid.

FLUID EXTRACT GOLDEN SEAL, WITHOUT ALCOHOL.

NUMBER.	Per Cent. berberine calculated from dried (105° C.) muriate.	Per Cent. hydrastine, by titration with volumetric acid.
1, . . . . .	1.46	1.3
2, . . . . .	2.	1.3
3, . . . . .	0.65	0.61
4, . . . . .	0.66	0.46
5, . . . . .	0.12	0.72
6, . . . . .	0.54	0.69

This preparation is used much more extensively than the Pharmacopœial extract, and therefore should be much richer in hydrastine, than shown in the above results which show up the quality of the preparation as made by leading manufacturers.

ANALYTICAL LABORATORY OF PARKE, DAVIS & CO.

June 16, 1893.

## THE DETERMINATION OF HYDRASTINE IN FLUID EXTRACT OF HYDRASTIS.

BY E. G. EBERHARDT, PH.G.

Read before the Ind. P. A.

Not so very many years ago the most important constituent of Hydrastis was considered to be berberine and the valuation of the drug was assumed to be accomplished with the estimation of that alkaloid. Since then, however, hydrastine has been found to be medicinally of greater importance and at present no valuation of the drug or its preparations can be considered complete that does not include an estimation of the white alkaloid. In looking over the literature very little is found to have been done in this direction. A. B. Lyons (*American Journal of Pharmacy*, 1886, pages 583 and 586), and also H. W. Snow (*American Journal of Pharmacy*, 1888, page 494) give some data for its estimation with Mayer's solution, but no specific directions for manipulating the drug or any of its



preparations. In the *American Druggist* for 1885, page 84, is a paper by W. Simonson on the estimation of hydrastine in fifty samples of powdered hydrastis. The method employed by him consisted in expelling the alcohol from two fluidounces of tincture representing sixty grains of drug, adding water to separate oil, resin, etc., and precipitating the crude alkaloid from the filtered solution with ammonia. This precipitate he collected on a filter, washed, dried and after weighing washed with hydrochloric acid and water until nothing more was dissolved, when after again drying and weighing the difference was taken as alkaloid. The average yield from the fifty samples operated upon by him was .125 per cent.

Having occasion to investigate a certain lot of fluid extract of golden seal the writer made a number of experiments, during which it was found that the addition of a small amount of ammonia to the fluid extract caused, after some time, the separation of hydrastine in well defined and remarkably pure crystals, but unfortunately accompanied by a dark flocculent precipitate that would on the filter accumulate into a compact mass very difficult to wash free of alkaloid. In following up this clue numerous attempts were made to avoid the precipitation of this dark substance without success. But the experiments developed a number of interesting facts.

It was found first, that, by observing proper conditions, the alkaloid could be obtained in comparatively large, acicular and nearly colorless crystals directly from the fluid extract.

Second, that the presence of ether in quantity sufficient to saturate the mother-liquor very much assists crystallization and enhances the purity of the product.

Third, that, if the fluid extract be heated before adding the precipitant, a larger yield of crystals is obtained.

Fourth, that the crystals can readily be separated from the accompanying flocculent precipitate by passing the liquid through a pellet of cotton loosely inserted in the neck of a funnel. The long needle-shaped crystals of alkaloid become entangled and are retained while the finely divided precipitate is permitted to wash through.

Fifth, that the presence of 20 to 25 per cent. by volume of officinal alcohol is necessary in order to secure good crystals, and

Sixth, that a good fluid extract of golden seal should yield from 1.5 to 2 per cent. of crystallized white alkaloid.

Without going into the tiresome details of many experiments the process finally found to give the best results was the following: Into an Erlenmeyer flask of at least 4 ounces capacity is put 25 cc. of the fluid extract. This is heated on the water-bath to a point considerably short of boiling. Ten cubic centimetres of ether are now slowly and carefully added so as not to cause loss by violent ebullition and lastly 25 cc. of a 2 per cent. ammonia solution, or a mixture of 20 cc. of water with 5 cc. of ammonia. The contents of the flask are rotated briskly for a few seconds and the whole then set aside for 12 hours, frequently rotating during the first two or three hours. After 12 hours the liquid is poured off into a funnel, into the neck of which a small plug of cotton has been loosely inserted and the whole dried and weighed. When the liquid has all passed through, the crystals remaining in the flask are carefully rinsed into the funnel and washed with distilled water until the washings pass off free of color. The funnel and contents are now dried at a temperature not exceeding 100° C., cooled in a desiccator and weighed. Subtracting from this weight the weight of funnel and cotton gives the amount of alkaloid obtained.

The fluid extract operated upon in all experiments was made with dilute alcohol and consequently after the addition of an equal volume of ammonia solution the mixture would contain approximately 25 per cent. by volume of officinal alcohol. This was found to give the most satisfactory results, all proportions having been tried from 50 per cent. down to 10 per cent. The officinal *F. E. Hydrastis* is made with a mixture of 3 parts of alcohol and 1 of water, which would necessitate the preliminary evaporation to 19 cc. or else the addition of 50 cc. of ammonia solution in order to reach the same proportion.

The addition of ether to a hot liquid naturally results in the loss of a large portion of it, but enough remains to saturate the liquid which is all that is required. An excess of ether causing the separation of an ether layer should be avoided.

Agitation is necessary as it facilitates the separation of alkaloid but violent shaking, especially at the time when crystallization is actively going on, must be avoided, as it results in the formation of many small crystals that are apt to pass through the cotton and be lost. The production of large crystals must be aimed at and when the process is properly conducted they can be obtained from  $\frac{1}{8}$  to  $\frac{3}{8}$  of an inch or more in length.

The crystals cannot well be collected on a filter for the impurity spoken of above, which is simultaneously precipitated, will also be retained and necessitate a second or even third crystallization. The use of cotton obviates this. A little practice, however, is necessary in preparing the funnel. If the cotton plug is inserted too tightly it will soon clog and render thorough washing impossible, if too loose alkaloid may pass through. Very naturally the cotton retains some coloring matter, but this can be ignored as it never amounts to more than a few milligrammes and does not introduce any appreciable error.

If it is desired to determine the amount of berberine also it can, by appropriate treatment, be obtained from the mother-liquor of hydrastine determination, but the order cannot with advantage be reversed, because when the fluid has once been treated with acids to precipitate berberine salts the hydrastine obtained from it is very impure and also more difficult to purify.

An alternative process of assay, which, however, requires more attention, consists in rendering 25 cc. of fluid extract alkaline with ammonia and rotating in a separator with three separate portions of ether of 15 cc. each, extracting the alkaloid from the mixed ether washings by agitating them with three portions of 10 cc. each of 2 per cent. sulphuric acid, and lastly with 5 cc. of distilled water, adding to the combined washings 10 cc. of alcohol, 3 cc. of ether and ammonia sufficient to render alkaline. After allowing to stand for six hours with frequent agitation, the crystals are collected, dried and weighed.

	SHAKING OUT		PRECIPITATION.	
	Alkaloid from 25 cc.	Per cent. of alkaloid.	Alkaloid from 25 cc.	Per cent. of alkaloid.
Fluid Extract No. 22907	.447	1.788	.458	1.83
	.455	1.82	.443	1.77
	—	—	.442	1.768
	—	—	.445	1.78
Fluid Extract No. 22911	—	—	.485	1.94 <sup>1</sup>
	—	—	.582	2.328

<sup>1</sup> This result was obtained after the fluid extract had stood for several days in a loosely covered vessel.

The results obtained in a limited number of determinations by both methods are given in the foregoing table.

A small amount of alkaloid is retained by the mother-liquor, for which perhaps a correction ought to be made. The quantity thus lost is proportionate to the amount of alcohol present and in a solution of the pure alkaloid under the exact conditions of the assay process amounts to .038 gram. Whether or not this correctly represents the amount retained by the mother-liquor in the assay of the fluid extract is a point that remains to be determined before the correction can be applied. The process has not yet been adapted to the assay of the drug, the tincture, the so-called non-alcoholic fluid extract and the various fluid preparations of hydrastine.

In conclusion, I will say that this assay process could be utilized in the manufacture of the alkaloid, and considering the largeness of the yield and the ease with which it can be isolated, there seems to be no reason why it should continue to command the enormously high price that has prevailed in the past.

ANALYTICAL LABORATORY, ELI LILLY & CO.

## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*Narceine and Aponarceine*.—When commercial narceine is heated with a concentrated alkaline hydrate solution, the narceine loses a molecule of water and forms the alkali salt of a new compound called *aponarceine*:  $C_{23}H_{29}NO_9 + NaOH = C_{23}H_{26}NO_8Na + 2H_2O$ . This alkali salt in *aqueous solution* upon the addition of an acid reunites with one molecule of water and forms chemically pure *narceine* melting at  $163^\circ C$ .:  $C_{23}H_{26}NO_8Na + HCl + H_2O = NaCl + C_{23}H_{29}NO_9$ ; if, however, to the *alcoholic solution* of the sodium aponarceine an alcoholic solution of an acid be added either free *aponarceine*,  $C_{23}H_{27}NO_8$ , melting at  $157-158^\circ C$ . or one of its salts like  $C_{23}H_{27}NO_8 HCl$  will be formed dependent upon the quantity of the acid added. These several preparations are intended for medicinal use and are covered by a German patent.—*Chemiker Ztg.*, 1893, 840.

*Sun-flower oil*, used considerably for adulterations, according to Dr. A. Jolles and E. Wild, has an iodine-absorption figure of 127 and with Becchi's test gives a more pronounced brown coloration than cotton seed oil; the test found to answer best in distinguish-



ing it from cotton seed oil is nitric acid of specific gravity 1.37, the latter oil becoming brown while sun-flower oil is not discolored.—*Chemiker Ztg.*, 1893, 879.

*Picramnin*, a crystallizable principle isolated by Dr. Peckolt from the fruit of *Picramnia camboita*, Engl., by extraction with petroleum ether and crystallization from alcohol, has been further studied by Dr. B. Grützner with the result that both physical and chemical properties place it among the *fats*, it being the glyceride of an unsaturated fatty acid and having the formula  $C_3H_5(C_{18}H_{31}O_2)_3$ .—*Chemiker Ztg.*, 1893, 879.

*Soluble colloidal barium sulphate*.—By mixing 120 parts of a 40 per cent. barium acetate solution with 80 parts of a 60 per cent. aluminium sulphate solution slightly acidified with acetic acid, a thick, transparent, pasty mass was obtained which only after standing for some time precipitated or changed into the usual white barium sulphate. The original mixture placed upon a filter gave a perfectly transparent filtrate which by diluting with water gave a white turbidity and separated barium sulphate; the residue in the filter after some time became white. Both of the reagents had been prepared with heat but had cooled to 15° C. before they were mixed. An explanation of this result on the ground of the solubility of barium sulphate in solutions of aluminium or barium acetates is not tenable since 200 cc. of the solution would have to dissolve about 36 grams barium sulphate.—George Buchner, *Chemiker Ztg.*, 1893, 878.

*The detection of cotton seed oil in lard and olive oil* by the nitrate of silver test is not trustworthy, since it has been shown that cotton seed oil by heating loses the property of turning brown with silver nitrate; F. Gautter has found the following modification of the sulphuric acid test to give reliable qualitative results: one gram of the *anhydrous* fat or oil is dissolved in 10 cc. petroleum-ether and agitated with one drop concentrated sulphuric acid. Pure lard will only give a pale straw or reddish yellow color, separating later some heavy reddish yellow globules while the supernatant liquid is colorless or faintly yellow; in the presence of cotton seed oil an immediate brown coloration is noticeable which enables the detection of *one per cent.* of the oil. Pure olive oil generally behaves like the pure lard, but may become slightly dark; in the presence of cotton seed oil,

the color is a deep or even black-brown. Arachis oil is the only other oil showing similar behavior towards sulphuric acid. For quantitative results calculation is made from the iodine absorption.— (*Ztschr. f. anal. Chem.*) *Chem. Repertorium*, 1893, 166.

*Analysis of bees-wax.*—The method proposed by Hübl whilst rapid and giving constant results (free acid equivalent 19–21, compound ether equivalent 73–76, saponification equivalent (the sum of the previous two) 92–97, ratio of free acid to compound ether : 3.60–3.80; the first three figures indicate the number of milligrams of KOH necessary for one gram of wax) is subject to the objection that the adulteration may be made with a mixture itself yielding the previous figures and which can therefore be added to wax in any proportion (such a mixture contains 35 parts stearic acid, 165 parts Japan wax and 300 parts ceresin-paraffin; it is possible for such a mixture to show the normal melting point and specific gravity of wax). In the analysis of wax it is therefore imperative to embody certain qualitative tests and to perform Hübl's determinations with wax melted under hot water and repeatedly washed to remove any acid which in the case of white wax especially could be introduced in the process of bleaching). The following are the qualitative tests: (1) *Stearic acid*. One gram is boiled for several minutes with 10 cc. 80 per cent. alcohol, allowed to cool to 18–20°, filtered and the filtrate diluted with water; the stearic acid separates in flakes and collects at the surface, while the liquid becomes transparent; the test is sensitive to *one per cent.*; if 7–8 per cent. are present, the acid remains suspended in the liquid forming a thick creamy mixture. (2) *Resin*. 5 gms. wax with 4–5 volumes of nitric acid sp. gr. 1.32–1.33 are kept at the boiling point for one minute, diluted with an equal volume of water and then made slightly alkaline with ammonia; the solution decanted from the separated wax in the absence of resin has a yellow color, whilst its presence causes a more or less intense red-brown color; one per cent. resin can be detected especially if a test with pure wax be made at the same time. (3) *Glycerides* (*Japan wax and tallow*) are tested for by evaporating the alcohol from the solution left after completing the Hübl's determinations, adding water, filtering, concentrating the filtrate and heating the residue with potassium bisulphate; the irritating odor of acrolein indicating glycerin and indirectly glycerides. (4) Negative results with 1, 2 and 3 and normal

figures, according to Hübl, exclude the presence of *ceresin* and *paraffin* and positively indicate a pure wax. To obtain the proper Hübl's figures in a wax adulterated with Japan wax or tallow, paraffin or ceresin would have to be added along with stearic acid or rosin; if adulterated with carnauba wax, stearic acid or resin must be added. In the analysis of white wax bleached with chemicals the acid equivalent may run as high as 24; this is the only deviation from the standard figures and is allowable, providing no stearic acid or resin is detected.—George Buchner, *Chemiker Ztg.*, 1893, 918.

*Geissospermine*.—From the bark of *Geissospermum Vellosii* two alkaloids were isolated by Hesse: Crystallizable *geissospermine*  $C_{19}H_{24}N_2O_2 + H_2O$  and amorphous *pereirine*  $C_{19}H_{24}N_2O$ . Under the name of *geissospermine* a beautifully crystallizable alkaloid is isolated by Trommsdorff; it has the formula  $C_{23}H_{28}N_2O_4$ , melts at  $189^\circ C.$ , and unites with one molecule of the monobasic acids. The researches of Langgaard give it physiological action simulating that of strychnine and brucine. The alkaloid is easily converted by loss of water into an amorphous base, melting at  $60-70^\circ$ , for which the formula  $C_{46}H_{54}N_4O_7$  is calculated; this base unites with four molecules of monobasic acids to form salts, and by fusion with potassium hydrate yields a crystallizable base, melting at  $151^\circ C.$ , which is being investigated.—M. Freund and Ch. Fauvet (*Berichte*), *Chem. Repertorium*, 1893, 177.

*Gelseminine*, precipitated from solutions of its pure salts, is a white, amorphous powder, which sinters at  $105^\circ C.$  and melts at  $120^\circ$ , undergoing partial decomposition. The analyses of the base and of some of its salts do not decide if its formula is  $C_{24}H_{28}N_2O_4$  or  $C_{22}H_{26}N_2O_3$ . The hydrochlorate is crystallizable, while the sulphate, because of its solubility in water and alcohol, was only obtainable in discolored flakes by adding ether to the alcoholic solution. The best crystallizable salt is the nitrate made by carefully adding nitric acid to the alkaloid suspended in water until a clear solution results, this, by standing, deposits crystals, melting with decomposition at  $188^\circ C.$  Platinic and gold chlorides cause respectively yellow and brown amorphous precipitates.—L. Spiegel (*Berichte*), *Chem. Repertorium*, 1893, 177.

*Alkaloidal color reactions*.—The principle of the furfural test for

alkaloids as published by E. Laves (*Am. Jour. Pharm.*, 1892, 375), has been applied to a number of alkaloids, but as will be noted the test is especially characteristic of *veratrine* and in a lesser degree also of *sabadilline*. The reagent was made by mixing 5 drops of furfural with 10 cc. concentrated sulphuric acid; to two or three drops of this brown-colored reagent a minute quantity of the alkaloid is added and stirred with a glass rod. *Atropine*, *aconitine*, *brucine*, *colchicin*, *coniine* and *nicotine* give brown mixtures with no characteristics; *strychnine*, a dirty brown mixture, upon warming becoming dark green, the addition of a few drops of water changes it to a dirty blue or violet; *morphine* and *codeine*, a red-brown color changing to a transient violet-red upon warming; *papaverine*, brownish, later dirty violet; *digitalin*, brown, upon warming reddish; *quinine*, dark brown green, after warming green later brown, the addition of water then causes a green color especially seen at the edge; *veratrine*, yellow, olive green, the circumference blue, after a few minutes green and then a beautiful blue; *sabadilline*, like *veratrine*, but the colors are not so pure.—Dr. N. Wender, *Chemiker Ztg.*, 1893, 950.

*For the determination of the iodine absorption of oils and fats.*—P. Welmans proposes a solution which is permanent or subject only to slight variation in titer. The solution is made by dissolving without heat 25 gm. iodine and 30 gm. mercuric chloride in 500 cc. ether and making up to one litre with acetic acid. The solution titrated at once, and after two weeks showed that no deterioration had taken place; compared with the original Hübl's solution in the examination of olive oil and lard, it was found to give almost identical results, also that the presence of ether did not necessitate the use of chloroform. Concerning the time required for the complete absorption of the iodine eighteen hours' standing at 17–20° C. was found to be sufficient, while six hours was insufficient; the influence of an excess of iodine was completely exerted in the presence of an excess of 28 per cent.—*Pharm. Ztg.*, 1893, 221.

*The assay of spirit of camphor* is conveniently accomplished by the use of the polariscope, Dr. E. Holdermann ascertaining that a spirit containing 10 per cent. camphor examined in the 200 mm. tube showed a deviation of about 10° to the right (9.6° exactly): by diluting with dilute alcohol such a spirit to 5 per cent. cam-



phor a deviation of  $+5^{\circ}$  is noted; by diluting to 1 per cent. camphor the reading will be  $+1^{\circ}$ . Each degree of dextrogyre deviation therefore indicates *one per cent.* camphor.—*Apotheker Ztg.*, 1893, 306.

*The examination of nitric acid for iodic acid* is best made by adding to 10 cc. of the 30 per cent. nitric acid a few fragments of metallic tin, applying a moderate heat and allowing to stand for one minute; by agitating with chloroform the latter will take up any iodine liberated from the iodic acid. This test has preference over others in that an excess of tin will not combine with the liberated iodine.—Dr. E. Pieszcsek, *Apotheker Ztg.*, 1893, 322.

*Cholera, a nitrite poisoning.*—Emmerich and Tsuboi, according to publications in the *Münchener med. Wochenschrift*, come to the conclusion that cholera is a nitrite poisoning, basing their conclusions upon the facts that the cholera bacillus is able to a greater extent than any other bacillus to reduce nitrates to nitrites and the internal administration of nitrites in quantity of 0.5–0.6 gm. is capable of producing very similar physiological effects in man. While other varieties of bacteria are capable of forming nitrites, none of these thrive in the intestines.—*Apotheker Ztg.*, 1893, 322.

*Galbanum*, as it now occurs in commerce, differs in certain respects from the galbanum of some years ago; in physical respects the consistency is more like *terebinthina*, while the odor resembles that of the so-called Levant galbanum. Towards solvents and the strong acids the greatest difference is shown, the strong acids acting upon the gum resin itself or its alcoholic solutions give only yellowish or brownish colorations instead of the violet colorations procurable according to several pharmacopœias. Petroleum-ether extracts from 23.50–30.50 per cent. resin and volatile oil after heating to  $120^{\circ}$  C. until constant weight is obtained from 3.5–4.5 per cent. resin is indicated; in previous investigations only 0.5–1.0 per cent. resin was found. This resin is soluble in sodium hydrate, and upon the addition of acid a substance called *galbanic acid* separates which later becomes crystalline. The presence of this larger percentage of resin interferes somewhat with the test for *terebinthina*; the petroleum-ether solution agitated with an aqueous cupric acetate with pure galbanum shows only a pale green color, whereas the pressure of 10 per cent. turpentine gives to the petroleum ether

solution an intense green color.—E. Hirschsohn, *Pharm. Ztschr. f. Russl.*, 1893, 353.

*Dulcin*, identical with sucrol (*Am. Journ. Pharm.*, 1893, 288) has the melting point  $173-174^{\circ}$  (not  $160^{\circ}$  C.); the solubility in water at  $15^{\circ}$  is 1 in 800, at  $100^{\circ}$  C. it is 1 in 50; in alcohol of 90 per cent. 1 in 25. Tests for purity are: (1) colorless crystals; (2) melting point; and (3) colorless solution in cold, concentrated sulphuric acid.—Dr. H. Thoms, *Pharm. Centralhalle*, 1893, 281.

*The leaves of vaccinium myrtillus* have attained some notoriety as a remedy for diabetes, it having been found by polariscopic examination that the administration of pills containing an extract of the leaves caused a decrease in the amount of sugar in the urine, as shown by polariscopic examination. Dr. von Oefele explains this observation, as follows: The leaves contain arbutin, which has for a long time been known to cause the urine to become lævogyre, and, therefore, the dextrogyre rotation of diabetic urine is decreased or even replaced by a lævogyre rotation. The fermentation test for sugar is also deceptive since the leaf constituents are known to restrict or even prevent fermentation of sugar and it is merely a question as to the quantity of the extract taken to entirely prevent activity in the yeast. It is interesting to note that the advocates of this remedy disregarded entirely the results obtainable with Fehling's solution, claiming that the strongly reducing effect of the urine was due to some constituents in the extract, and that the two tests, the actions of which were explained above, were only to be relied on; Dr. v. Oefele, however, states that Fehling's test reveals the true condition of the patient.—*Pharm. Centralhalle*, 1893, 306.

*Hydrochloric acid containing selenious chloride* as an impurity is not unfrequently met with; it has an especially destructive action upon copper vessels, acting in all probability as a carrier of chlorine, thus enabling the acid to dissolve considerable quantities of metallic copper even in the absence of any considerable amount of air or oxygen.—J. E. Gerock, *Journ. d. Pharm. v. Els. Lothr.*, 1893, 177.

*An estimation of some metals and alkaloids* is proposed by Professor Vitali, which in case of a metallic salt, consists in dissolving it in distilled water absolutely free from air, precipitating the metal with hydrogen sulphide and titrating the liberated acid with  $\frac{n}{10}$  sodium hydrate after filtering out the metallic sulphide; from the quantity

of acid found the weight of the metal is ascertained. In the estimation of alkaloids these must be present either as hydrochlorate or as sulphate; the former salt is precipitated with silver nitrate, the latter with lead nitrate; the precipitates obtained are suspended in water, decomposed by hydrogen sulphide, and the liberated acid, corresponding to the amount of alkaloid, titrated with  $\frac{n}{10}$  alkali.—(*Bollet. farmac.*), *Pharm. Post*, 1893, 297.

*Benzoin constituents*.—The results of an analysis of *Sumatra benzoin* concluded shortly after the appearance of the analysis by F. Lüdy (*Am. Journ. Pharm.*, 1893, 223) are briefly stated: (1) The *benzoic acid* occurring in this variety is free, while the *cinnamic acid* is combined as salts of benzoiresinol and resinotannol; (2) *Styrol* is uncombined and present only in small quantity; (3) the chief constituents are the *esters of benzoiresinol* and *resinotannol*, the latter being in larger quantity; (4) *Sumatra benzoin* is completely soluble in ether and alcohol; petroleum-ether (boiling point 40° C.), and petroleum-benzin (boiling point 65° C.) dissolve very little; benzol is only a partial solvent; (5) *vanillin* is present uncombined and exists in quantity of less than 1 per cent. *Siam benzoin* gave results as follows: (1) It is sparingly dissolved by petroleum-ether and petroleum-benzin; benzol dissolves about 90 per cent., while ether and alcohol dissolve it completely; (2) the *benzoic acid* (cinnamic acid was not found) is present in very large part, as the ester of benzoiresinol and resinotannol, in small quantity it is present in the free state; (3) the chief constituents are again the *benzoic esters of benzoiresinol* and *resinotannol*, the latter predominating; (4) *vanillin* is present uncombined to the extent of 1.5 per cent.; (5) benzyl-benzoate was not detected.—J. Salkind (*Dorpat Dissert.*), *Pharm. Post*, 1893, 330.

## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*A process for the volumetric estimation of mercury* based upon the reaction of a mercuric salt with protochloride of tin is published by M. J. Laborde (*Jour. de Pharm. et de Chim.*, May, 1893, p. 507). For obtaining the protochloride solution, 8 gm. of tin are dissolved in 100 cc. hot hydrochloric acid and diluted to 2 litres. Ordinary precautions must be taken to preserve it as far as possible from the

action of the atmospheric oxygen. This liquid is titrated with a solution of bichloride of mercury (10 gm. to the litre) and to counteract the retarding action of the hydrochloric acid contained in the tin solution, 0.1 gm. of the mercuric salt is treated with 5 cc. of a liquid containing 100 gm. ammonium acetate and 100 gm. acetic acid per litre. The acetic acid disperses the brown color which appears when the protochloride of tin is in excess.

This dispersion takes place more slowly toward the end of the reaction, which is indicated by the entire liquid assuming a brown color upon the addition of 3 or 4 drops more of the tin solution. Upon determining by known methods the quantity of protochloride of tin which corresponds to a given weight of bichloride of mercury, it will easily be seen that the reaction takes place according to the theoretic formula:



This process is very convenient, rapid and precise, and can be used inversely, for estimating protochloride of tin in a solution, by the aid of a titrated solution of bichloride of mercury.

*Oil of cinnamon* is considered by M. Lucas-Championnière, who has for some time been using certain oils in the place of the toxic antiseptics, of disagreeable odor, as superior even to sublimate as an antiseptic. Its slight solubility in water renders it rather irritant to the skin, but this is nullified by dissolving one per cent. in retinol. It is necessary for this solution to first rectify the oil of cinnamon, the rectified product bearing the name *cinnamol*. A salve, composed of cinnamol, retinol and wax, has a good effect upon the healing of aseptic wounds.

*The oils of verbena and geranium* have analogous action. These oils are easily absorbed, and are eliminated by the urine.—*Rev. therap. med. chir.*, June, 1893, p. 290.

*Chlorobromide of iron*.—At normal temperature and under ordinary pressure a combination of bromine and anhydrous protochloride of iron is effected only after a month or more of contact. However, using a sealed tube, operating at about 100° C. and using an excess of bromine (10 cc. to about 2 gm. protochloride of iron) crystals begin to appear after 24 hours; after about five days all the protochloride of iron is transformed into a volatile, crystalline product, which excess of bromine will not again dissolve.



This product was estimated by removing the uncombined bromine in a current of dry carbonic acid, and calculating the iron as the sesquioxide; the bromine and chlorine were estimated by the method of H. Rose; that is, submitting a mixture of silver bromide and chloride to a current of dry chlorine, and calculating the bromide by loss:

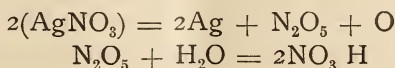
Calculated. Fe <sub>2</sub> Cl <sub>2</sub> Br.	Found.		
Fe = 27'05	27'25	27'19	27'13
Cl = 38'65	39'09	38'69	38'80
Br = 34'30	33'61	33'98	34'03
100'00	99'95	99'86	99'96

The crystals are green by reflected light and perfectly opaque; the system of crystallization could not be determined. They are very deliquescent, and very soluble in water; the solution in the smallest possible quantity of water is accompanied by a notable disengagement of heat. Solution in ether is a test of purity, the protochloride of iron remaining undissolved. It is also soluble in alcohol, chloroform, benzin and toluene; insoluble in carbon bisulphide. It loses some bromine at ordinary temperatures and at the temperature of the Bunsen flame, loses nearly all of it, leaving a residue of anhydrous protochloride of iron.—M. C. Lenormand, in *Four. de Pharm. et de Chim.*, May, 1893, p. 503.

*Solution of silver nitrate* has been found by van der Spil (*Geneesh. tydsch. von Ned. Ind.*, through *Rev. int. de bib. med.*, June, 1893, p. 213) to become gradually less clear, if the glass of the container is of poor quality; that is, if it contains considerable alkali.

*Copper sulphate solution* will undergo the change from the same cause.

*Reduction of silver nitrate by the action of light.*—M. Roux was led to investigate this subject by the explosion of an old argentic solution, for which there seemed no cause. He introduced into a tube, a concentrated, perfectly neutral silver solution, and exposed it to the light in the presence of distilled water. After several weeks, the silver nitrate was reduced to metallic silver, a gas, giving all the reactions of oxygen, was disengaged, and the solution which had been neutral presented a slightly acid reaction—probably by the following equations:



In the opinion of the author, the explosion of the solution mentioned, which was one of the many solutions for the marking of linen, based on silver nitrate, is explained by the presence of sodium carbonate and ammonia, in sufficient quantity to redissolve the precipitate of argentic carbonate, formed from the mixture of the two solutions, the solution becoming acid, and decomposing the sodium carbonate into sodium nitrate, water and carbonic anhydride. In the opinion of the author, the addition of ammonia in excess, beside the use of yellow glass containers, for such solutions is necessary for preventing such explosions.—*Jour. de Pharm. et de Chim.*, May, 1893, p. 510.

*Stability of glycerite of starch.*—In M. Patel's opinion this can be attained by heating the mixture at an elevated temperature a sufficient length of time to dissolve all the starch granules. M. Chapelle, while admitting the stability of the preparation by this means, says that the product has not the proper creamy consistence, and that success depends only upon the nature of the material used, while M. Muller recommends the addition of a little gum tragacanth.—*Bulletin commercial*.

*Oxalic acid* is prescribed as an emmenagogue by Dr. V. Poulet, in the following formula: Oxalic acid, 2 gm.; infusion of tea, 190 gm.; syrup of bitter orange peel, 75 gm. A tablespoonful to be taken every hour.—*Rev. ther. med. chir.*, July, 1893, p. 353.

*Cantharidin* is prepared by the following process, which is said to yield a product superior to that obtained by other processes: Macerate the pulverized cantharides in acetic ether and add a little sulphuric acid; neutralize with barium carbonate, exhaust with acetic ether and distil the solution. The residue is evaporated to dryness, treated with petroleum-ether, then with alcohol to remove resinous coloring matters and purified by repeated crystallizations. By this process *Lytta vesicatoria* yielded 0.3–0.45 per cent. of vesicating principle; *Epicanta Gorrhami*, 0.45 per cent., and *Mylabris Cichorii*, 0.9–1.03 per cent.—*Jour. de Pharm. et de Chim.*, April, 1893.

*Diuretin*, according to Pawinski (*Gaz. lek.*, Jan., 1893, through *Nouv. Rem.*, June, 1893, p. 253), who studied its action in more than 50 cases, does not regulate the cardiac nerves like *digitalis*, but still regulates the pulse indirectly, in augmenting diuresis and diminish-

ing œdema; it retards the heart-beats, and increases the blood pressure, and while it is inferior to digitalis or caffeine, it has undoubted diuretic properties, the secondary effects, however, such as headache, a buzzing in the ears, somnolence (in patients of advanced age) or insomnia being less pronounced, than after the administration of caffeine. The author prescribes it in daily doses of 3-4-5 gm., preferring it in the form of a solution, the powder becoming insoluble, by reason of the precipitation of theobromine caused by its combination with the carbonic acid of the atmosphere.

*Creosote* is rendered soluble in water by the following formula: Creosote, 10 gm.; tincture of *Quillaia saponaria*, 80 gm.; distilled water 60 gm. A tablespoonful of this liquid contains one gm. of creosote, which is in actual solution, and not merely in suspension. —M. P. Carles, in *Rep. de Pharm.*, May, 1893, p. 199.

*Carbolic acid* has been used with good results by M. A. Strisover (*Med. Obozr.*, 39, 1893, through *Nouv. Rem.*, June, 1893, p. 264), in the treatment of several cases of rectitis which would not yield to any other measures. The remedy was prescribed twice daily as a wash, prepared by adding ten drops of the acid to two glassfuls of water, as hot as it could be borne, each washing being continued from 6 to 10 minutes.

*Citrate of caffeine*, for hypodermic injection is used by Soucheyre (*Gaz. des Hopitaux de Toulouse*, April, 1893) in the following solution: Citrate of caffeine, 2.50 gm.; sodium benzoate, 2.50 gm., and distilled water, 10 gm.

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## RUBBER IN SIERRA LEONE.

BY G. F. SCOTT ELLIOT.

The rubber exported from West Africa is of two kinds. One is derived from the so-called rubber vines, which appear to be all species of *Landolphia* or *Carpodinus*; the other is derived from a tree, *Ficus Vogelii*, and possibly also from other species of fig. The most important kinds in the district through which we passed, "Oro," "Djengé," "Furé," and "Genyé" (all rubber vines), were found in old forest, and the amount existing at present cannot be large. The natives have long since cleared the land of the original primeval forest in all the parts below 1,000 feet, and the country is either under cultivation for cassada or is covered by grass or bush

from three to ten or twelve years old. The natives seem in most districts usually to make a fresh clearing after the bush has attained this age, and consequently these kinds of rubber do not get a chance of growing, as they all, so far as I have seen personally, prefer old forest where the trees are at least twenty years old, and the soil consists of a rich, moist humus, or is, at any rate, a mixture of leaf mould and other soils. On the other hand, on the plateaux of iron pan and gneiss from 1,000 feet upwards to 3,000 feet, the trees, though numerous and in large part of considerable age, are too isolated, and the soil is too dry and hard for these rubbers. In fact, the amount of rubber available from the rubber vines depends on the amount of original forest, and this is not large in the district we traversed.

On the other hand, there are enormous areas from which rubber could be obtained, provided the district was freed from the never ceasing native wars and slave-raiding expeditions. Thus the country about Laya and Kofiu Mountain, as well as the Benna country along the edge of which we passed, is full of forests and contains much rubber which would, if the roads to Kambia were safe, pass down the Scarcies River. The Fula country, lying back from the north-west corner of the English sphere of influence, is also said to be full of rubber, which would most probably come down the same way. Along the tenth degree of north latitude the country is in many places broken and mountainous, and the deeper and narrower valleys are full of dense forest, from which the rubber could be profitably withdrawn. There is also in all probability an enormous supply in the almost uninhabited Koronko district, and in the magnificent woody valleys about Bafodeya and other parts of the Limba country, on the Upper Rokelle and especially in the back country of Sherboro. I should think it probable that with roads made absolutely safe, the supply of rubber from the colony might be doubled, or even quadrupled in amount, but with the development of lawlessness, and the constant native wars everywhere, but little is to be expected after the next few years, when the sources readily reached from the coast have been drained of their supplies. It must also be remembered that the supply is one which is likely to be exhausted with increase of population and ought not to be reckoned upon for more than a few years, supposing the country were rendered safe.



This, however, only applies to the above-mentioned kinds, and does not affect the supply derived from *Landolphia florida*, and the other species of *Carpodinus*. These latter plants were found in fairly open dry ground, at from 1,000 to 3,500 feet, and are probably very abundant everywhere. The rubber yielded by them is neither so good nor so abundant as that from the above-mentioned kinds, though probably it could be immensely improved by better means of extraction. With regard to the rubber from trees, I only found *Ficus Vogelii* once in the Niger drainage area; this is the kind found at Bassa and lower down the coast. There are about thirty-nine specimens of *Ficus* sorts in my collection, and it is of course possible that several of these yield rubber, but the only other species of which I heard this is a new species. On the whole, the supply existing in the country we traversed cannot be considered as of great importance.—*Colonial Report*; from *Pharm. Jour. and Trans.*, July, 1893, p. 25.

## REPORT OF TWO SAMPLES OF "IPECACUANHA."<sup>1</sup>

BY PROFESSOR JOHN ATTFIELD, PH.D., F.R.S.

(1) Each sample was duly sealed in red wax, impressed "London and India Docks Joint Committee."

(2) One sample was labelled as follows:—"London and India Docks Joint Committee. Ex *Tamar* and Rail. 93/447. J. F. M. No. 2. 1 Bale. 2 lbs. sample *Ipecacuanha*. Crutched Friars Warehouse. 29.5.93."

(3) The other sample was thus labelled:—"London and India Docks Joint Committee. Ex *Tagus* and Rail. 93/333. DV L. No. 59. 1 Bale. 2 lbs. sample *Ipecacuanha*. Crutched Friars Warehouse. 29.5.93."

### The "No. 2" Sample.

(4) I find this to consist of 65.7 per cent. of official *ipecacuanha*, and 34.3 per cent. of *ipecacuanha* stems.

(5) The 65.7 parts of official *ipecacuanha* contain 1.327 parts of the alkaloidal substance known as emetine.

(6) The 34.3 parts of *ipecacuanha* stems contain 0.648 parts of similar emetine.

<sup>1</sup> *Pharm. Jour. and Trans.*, July 15, 1893, p. 48.

(7) Therefore, 100 parts of this No. 2 sample of so-called ipecacuanha yield 1.975 parts of emetine; for 1.327 plus 0.648 equal 1.975.

(8) Further, a direct determination of the alkaloid in this No. 2 sample gave me 1.950 per cent. of emetine.

(9) The figures in paragraph 5 show that the official ipecacuanha in this No. 2 sample contains 2.020 per cent. of emetine.

(10) The figures in paragraph 6 show that the ipecacuanha stems in this No. 2 sample contain 1.890 per cent. of emetine.

(11) The moisture in the official ipecacuanha of the sample amounts to 9.9 per cent.; the moisture in the stems to 8.1 per cent.; in the whole sample, 9.3 per cent.

### *The "No. 59" Sample.*

(13) I find this to consist of 62.6 per cent. of official ipecacuanha and 34.4 per cent. of ipecacuanha stems.

(14) The 62.6 parts of official ipecacuanha contain 1.252 parts of the alkaloidal substance known as emetine.

(15) The 34.4 parts of ipecacuanha stems contain 0.546 parts of similar emetine.

(16) Therefore, 100 parts of this No. 59 sample of so-called ipecacuanha yield 1.798 parts of emetine; for 1.252 plus 0.546 equal 1.798.

(17) Further, a direct determination of the alkaloid in this No. 59 sample gave me 1.820 per cent. of emetine.

(18) The figures in paragraph 14 show that the official ipecacuanha in this No. 59 sample contains 2.000 per cent. of emetine.

(19) The figures in paragraph 15 show that the ipecacuanha stems in this No. 59 sample contain 1.46 per cent. of emetine.

(20) The moisture in the official ipecacuanha of the sample is practically 10 per cent.; in the stems 8 per cent.; in the whole sample, 9.3 per cent.

### *Remarks.*

(21) These two samples of so-called ipecacuanha contain, in round figures, two-thirds only of official ipecacuanha and one-third of ipecacuanha stems.

(22) By official ipecacuanha I mean that which alone is recognized by the compilers of the British Pharmacopœia, and, therefore, that which can alone be used legally, under the Medical Acts in the official "Preparations" of ipecacuanha, namely, true *roots*.

(23) *Ipecacuanha stems* have no official value, indeed, they have no official position.

(24) The 2 per cent. of emetine I find present in the official *ipecacuanha* of these two samples of so-called *ipecacuanha* is somewhat above the average proportion of emetine present in official *ipecacuanha*; for though still higher proportions have been recorded, a large number of lower proportions have been published; my own analyses of other samples also point to at most  $1\frac{3}{4}$  rather than 2 per cent.

(25) But, in truth, nature knows no "average" proportion of alkaloid in drugs; differences in soil and climate in different places, or in the same place in different years, causing great variations. Secondly, while such an alkaloid as, say quinine or morphine, has at least fixed and definite properties, the so-called "emetine" has not yet been obtained in a sufficiently fixed and definite condition to enable us to say that it is one single substance, emetine, and nothing else; hence, analysts at present have to rely on the general alkaloidal characters of the article termed "emetine" which they extract from *ipecacuanha*. Thirdly, the acids and alkalies that are used by analysts attack "emetine," therefore the yield of "emetine" will only be constant when the conditions of manipulation are constant.

(26) A conventional process for the assay of *ipecacuanha*, described with great detail and under well-recognized authority, will doubtless be forthcoming in due time if no more scientific process should be discovered. Meanwhile, if analysts were to extract with cold ammoniacal chloroform first, and hot afterwards, and conduct any evaporation at as low a temperature as possible, maximum and fairly concordant results as regards any one sample analyzed by different analysts might be expected.

(27) It is to be hoped that any future authoritatively enjoined "standardization" of *ipecacuanha* founded on proportion of emetine will be therapeutically satisfactory, but such a position is not yet attained. Indeed, it would seem that *ipecacuanha* root from which all "emetine" is removed still has pharmacological value. The latter may or may not run parallel with percentage of "emetine." Meanwhile, our only guide is "emetine" estimated with all attainable accuracy.

(28) We may be said to know nothing, and to be able to infer but

little pharmacologically, respecting ipecacuanha *stems*. Even the estimations of "emetine" in ipecacuanha stems are too few at present to warrant generalization as to the relative proportion of "emetine" in stems as against "emetine" in root.

(29) I regret that the present state of knowledge regarding the pharmacology of ipecacuanha and its alkaloid or alkaloids or other active principles, either on the chemical or medical side of pharmacology, prevents me writing any more definite report than the foregoing. And I fear that little more can be said on the subject until the drug and its contents have been submitted to thorough original research by some agency commanding commensurate knowledge, funds, and general resources.

## CHLORALOSE, A DERIVATIVE OF CHLORAL, AND ITS PHYSIOLOGICAL PROPERTIES.<sup>1</sup>

BY HANRIOT AND C. RICHTER.

Equal quantities of anhydrous chloral and dry glucose are heated together at 100° for an hour, and the cooled product is mixed with a small quantity of water and extracted with boiling ether. The portion soluble in ether is distilled repeatedly with water until all chloral is expelled, and the aqueous solution is then subjected to fractional crystallization; in this way, the anhydroglucochloral which has already been described by Heffter (Abstr., 1889, 845), and which the authors propose to call *chloralose*, is obtained in two forms, namely, chloralose, which crystallizes in slender needles melting at 184–186°, and volatilizing without decomposition, and *parachloralose*, which crystallizes in nacreous lamellæ melting at 229°. The latter is soluble with difficulty even in hot water. Both substances have the composition  $C_8H_{11}Cl_3O_6$ .

Chloralose with sulphuric acid yields a disulphonic derivative, and with acetic anhydride a tetracetyl derivative. Contrary to the statement of Heffter, it does not yield glucose when treated with potassium hydroxide.

Parachloralose, probably by reason of its insolubility, is without physiological activity, but chloralose, when administered by ingestion, produces hypnotic effects, and at the same time increases the excitability of the spinal marrow. When given to dogs in the

<sup>1</sup> *Comp. Rend.*, **116**, 63–65; *Jour. Chem. Soc.*, Abst. I, p. 247.



proportion of 0.6 gram per kilogram of body weight, it produces only anæsthesia, and not death. The hypnotic effect begins to be evident with doses so small as 0.02 gram per kilogram of body weight, and hence, chloralose is much more active than chloral, and its effect cannot be attributed to a decomposition into chloral. When administered to human beings in doses of from 0.2 gram to 0.75 gram, but not exceeding 1 gram, it acts as a valuable hypnotic, producing no disturbance of digestion, no cephalalgia, and no phenomena of intoxication.

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### CAPARRAPI BALSAM.<sup>1</sup>

BY DR. T. BAYÓN.

Corresponding Member of the Pharmaceutical Society of Great Britain.

This so-called balsam derives its name from the village of Caparrapi in the province of Cudinamarca, in the United States of Columbia, where it is prepared. The plant which yields it is a large forest tree belonging to the natural order *Lauraceæ*, and is one of the loftiest members of this family. It grows at an altitude of about 1,300 metres above the level of the sea, and in a climate where the mean temperature is 21° C.

The tree has not hitherto been described by botanists, and may be characterized as follows :

*Laurus giganteus*.—An evergreen tree, with aromatic leaves and bark, the fruit and calyx exhaling an odor of cinnamon. The bark exfoliates in small pieces. The branches are opposite, cylindrical, and glabrous. The leaves are alternate, stalked, oval-oblong and lanceolate, coriaceous, shining on the upper surface and greenish white beneath, with only one median nerve. The flowers are small, regular, hermaphrodite, and are arranged in paniced dichotomous cymes. The receptacle is cup-shaped. The perianth is persistent ; it has five segments. There are twelve stamens in four rows of three each ; the two exterior rows have introrse anthers, the third row has extrorse anthers and filaments furnished with two lateral stalked glands at their base, and the fourth row consists of sterile stamens. The anthers are four-celled, with loculicidal dehiscence. The ovary is simple and one-celled, with a simple style and capitate

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<sup>1</sup> Abstract from the original Spanish, in the Pharm. Jour. Trans., June 24, 1893, 1045.

stigma. The fruit is baccate, oval like the fruit of *Quercus Ballota*, but striated from base to apex; it remains attached to the persistent calyx and receptacle. The seed is oily, and has a burning taste like capsicum.

The balsam is obtained by making a horizontal incision into the trunk, the lower part of the incision being made concave so as to retain the balsam that drains into it. The upper part of the incision is made so as to prevent moisture entering in case of rain, and the incisions are usually made on the sunny side of the tree. The balsam has an aromatic odor; in color it varies according to the age of the tree, but usually resembles balsam of tolu, than which it is more fluid. In medicine it is used by the natives as a stimulant for catarrhal complaints, especially when of a chronic character, such as bronchitis, laryngitis, nervous catarrhal asthma, and also for chronic inflammation of the genito-urinary tract, such as catarrh of the bladder, leucorrhœa, and obstinate blenorragia. It is used in several preparations in the following proportions: syrup, 30 to 50 grammes; pastilles, 2 to 10 grammes; tincture, 2 to 10 grammes; electuary, 1 to 4 grammes. It is also given alone in doses of  $\frac{1}{4}$  to 2 grammes, and may be administered in the form of pills, cigarettes, or fumigations. By the natives it is employed in the treatment of snake bites and the stings of poisonous animals, as the ray and scorpion, and the poisonous arachnid, known locally as the "coya." The balsam is usually applied externally, and given internally in a dose up to 30 grammes, according to the severity of the poison. In a case of poisoning by the coya, in which an insect had accidentally been crushed on the leg, and the poison absorbed, the patient lost consciousness and sensibility, and had lockjaw for sixty hours, but an external application of the balsam and a dose of 10 drops taken in 2 grammes of alcohol and 30 grammes of water served to effect a cure.

## ON THE ALKALOIDS OF GELSEMIUM SEMPERVIRENS.

BY ARTHUR R. CUSHNY.

(Berichte Deutsch. Chem. Gesell., 1893 p., 1725.)

The author has examined the alkaloids found in *Gelsemium*, retaining the names proposed by Gerrard and Thompson, namely, gelsemine, for the alkaloid yielding crystalline salts, and gelseminine for the other.

(1) *Gelsemine* is a dry, non-crystalline mass, white in color, bitter, strongly alkaline and insoluble in water. Neither nitric nor sulphuric acids give color reactions, but if an oxidizing agent, such as manganese peroxide, cerium oxide or potassium dichromate be added to a solution in the latter liquid, it assumes an intense red color which gradually becomes green. The gold and platinum double salts are soluble in hot water, and on cooling separate in a crystalline state. An analysis of the hydrochlorate showed the formula  $C_{49}H_{63}N_5O_{14} \cdot 2HCl$ .

(2) *Gelseminine* is amorphous, strongly alkaline, insoluble in water, but soluble in alcohol, ether and chloroform. The salts are amorphous, yellow and easily soluble in water. Sulphuric acid colors it yellow; nitric acid, green; sulphuric acid and oxidizing agents, violet gradually becoming green. The platinum double salt is amorphous and brownish yellow in color and easily soluble in water and alcohol. By liberating the alkaloid polymerization takes place. Analysis showed the formula  $C_{42}H_{47}N_3O_{14}HClPtCl_4$ .  
 H. C. C. M.

## THE BOTANY AND CHEMISTRY OF ESSENTIAL OILS.<sup>1</sup>

By H. A. D. JOWETT.

*Botany.*—The essential oils or products from which they are derived appear to be confined to certain orders, *Rutaceæ*, *Myrtaceæ*, *Umbelliferæ*, *Compositæ*, *Labiataæ*, *Lauraceæ*, *Coniferæ*, and others, but though confined to a relatively few natural orders, they are found in all parts of the plant, and may occur in seeds, roots, stem, leaves or flowers.

The oil is generally contained in special receptacles in the plant, which may be divided into vessels and cavities, and, indeed, they are often classified under these heads, but I prefer to treat of them as (a) of protogenetic origin, arising by the differentiation of fundamental tissue, and (β) of hystero-genetic origin, appearing in differentiated tissue.

Those of protogenetic origin, which are by far the most common, may furthermore be divided into vessels and cavities.

(1) *Vessels.*—These are generally of schizogenous origin, and occur in *Coniferæ*, *Compositæ* and *Umbelliferæ*. They are formed in

<sup>1</sup> Read at a meeting of the Chemists' Assistants' Association, held on Thursday, March 2, from Pharm. Journ. Trans., July 1, 1893, p. 6.

a simple way, well exemplified in *Pinus*. An intercellular space already existing or produced by division of a mother cell into four daughter cells becomes very much enlarged, and the cells surrounding it become modified, for by radial and tangential division they form an epithelium surrounding the vessel, and these in turn are surrounded by a tapetal or protective layer, and this often by a ring of sclerenchyma.

The epithelium secretes the oil as drops in the vessel, and the two protective layers prevent transfusion of the oil to the surrounding tissue.

The drops of oil thus formed coalesce until gradually we have the vessels filled with the essential oil. These passages generally occur in the cortical parenchyma of the plant, which is the great metabolic tissue, but they may occur either in the pith or primary xylem, as in *Philodendron*, whilst in the *Umbelliferae* the passages are produced from intercellular spaces produced by the splitting of the walls of certain cells abutting on the pericycle.

(2) Cavities are generally formed lysigenously, and occur in *Rutaceae*, *Labiatae*, *Myrtaceae*, and are generally produced in the following way: Two cells becoming meristematic give rise, by cell division, to a number of smaller cells, which secrete drops of oil, and by the coalescence of these drops the space formerly occupied by the cell is filled with the oil, the cell wall in the meantime having been dissolved, perhaps by an enzyme.

In *Myrta communis*, according to Frank (*Beitr.*, 125), a cell divides into eight octants, and these form an intercellular space, which, gradually becoming filled with oil, crushes the cells to the side, and they thus become flattened, form an epithelium. This is a case of schizogenous formation, but the details are doubtful, and fresh observations must be made before fully accepting this as a mode of formation of the oil cavity.

The spots in *Hyperica* and cells in *Eucalyptus* are formed thus, and it may be taken as a general rule that vessels are formed schizogenously and cavities lysigenously. We now examine the other divisions of oil receptacles, those of hystero-genetic origin.

(3) They exist both as vessels and cavities, but are not nearly so common as those I have just described. In *Copaifera* and *Dryobalanops* the oil receptacles are of enormous size, and are formed by disorganization and solution of the heart wood, and they are also



formed in the secondary bast of certain *Umbelliferæ* and *Compositæ*.

In the *Coniferæ*, when the cortical parenchyma disappears owing to secondary thickening, the resin vessels are replaced by sacs of lysigenous origin.

According to the researches of Mesnard, the oil is produced from tannoid substances (formed from the chlorophyll) in the absence of light and oxygen. Thus, in the sepal the oil is found in the cells on the upper surface, protected from light and oxygen in the bud, and the tannin and pigments in the cells of the lower surface which have been exposed to light and oxygen.

He finds that the oils are thus formed in the jasmine, rose and violet, but in the orange there are several oils, and in the *Tuberacæ* the oil is found on the lower surface, and this abnormal result is probably due to the presence of a fixed oil and abundance of chlorophyll, for these oils are always found in the cells of palisade parenchyma, and thus result from chlorophyll.

In some cases the oil is produced by enzymes from other complex bodies, *e. g.*, Valerian, oil of bitter almonds, and possibly salicin.

Some doubt exists as to whether the oil exists as such in the vessels of the *Coniferæ*, or whether the oil is produced by the decomposition of this body.

We have thus left the question of the physiological function of these oils to the last, and the answer, it must be confessed, is more of a conjecture than statement of facts.

It is now well known that the food taken into an organism may be divided into two parts—that assimilated and used in the metabolic processes of the plant, and that which is not so used, and is thus rejected by the organism. In animals the portion not assimilated is excreted, and passes away from the organism, but in plants this is not always the case. In a few plants, as *S. Incrustata*, special apparatus exists for the excretion of material not required by the plant, but in most cases the plant disposes of the matter by secretion in certain sacs or vessels or renders them harmless by combination with other bodies, as calcium oxalate.

There is little doubt but that essential oils, resins, alkaloids, etc., fall under this category, and must be viewed as bye-products in the metabolic processes of the plant. They are not exactly degradation products, as gums, etc., but are substances produced by the plant which are of no use to it.

To summarize—the oils are found in vessels or cavities of proto-genetic or hystero-genetic origin, and are produced by the proto-plasm, probably as bye-products in the elaboration of the food material of the plant.

*Chemistry.*—The constitution of the oils is so varied that it is difficult to divide them into any well-defined groups, but for the sake of convenience we may study them in the following classes:

(a) Oils which are single chemical compounds, and whose constitution is known, as oil of bitter almonds, wintergreen, etc.

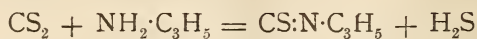
(β) Terpenes or the constituents present in most essential oils, belonging to the hydrocarbons, as pinene, limonene, etc.

(γ) Other constituents in the oil, and to which often the peculiar odor is due. These may be further subdivided into aldehydes, ketones, alkyl salts, alcohols, phenol derivatives, etc.

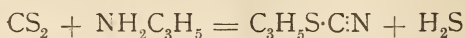
(a) There are not many essential oils consisting of one body, but there are a few, the chief of which are—oil of wintergreen obtained from *Gaultheria*, *Procumbens* and *Betula lenta*, essential oil of mustard, oils of rue, meadow-sweet (*Spiræa Ulmaria*) and bitter almonds. Of these the oil of wintergreen is an alkyl salt, and is 1·2 methyl salicylate,  $C_6H_4 \cdot OH \cdot COOMe$ . Oil of meadow-sweet belongs to the same series of bodies, but is the aldehyde of the acid of which oil of wintergreen is the methyl ester. It is salicyl aldehyde,  $1 \cdot 2 C_6H_4 \cdot OH \cdot CHO$ . Both may be made by generic methods.

Oil of bitter almonds is, of course, benzaldehyde, and rapidly oxidizes into the acid.

These all belong to the aromatic group, but the other oils belong to the aliphatic series. Essential oil of mustard is allyl-isothiocyanate, and bears the same relation to the thiocyanate that carbamide does to a nitrile. It is prepared by a method which one would expect to yield thiocyanate, which is probably the case. By treating allylamine with  $CS_2$  we get first the thiocyanate, which, on distillation, undergoes molecular rearrangement, forming the iso-mustard oil



Though really



and



Oil of rue is a ketone, and consists of methyl nonyl ketone,  $\text{MeC}_9\text{H}_{19}\text{CO}$ , but its constitution is not fully known, as it is possible for several isomers of this formula to exist, and the particular formula for  $\text{C}_9\text{H}_{19}$  has not yet been worked out.

( $\beta$ ) We pass on to the terpenes, with which are ever associated the name of Tilden and Wallach.

These occur in very many essential oils, particularly those of the *Coniferae*, which consist almost wholly of terpene, but many oils—oil of lemon, thyme, fennel, etc.—contain one or more of these terpenes.

They may be represented by the formula  $(\text{C}_5\text{H}_8)_n$ , and are closely related to cymene.

The number of isomers is much smaller than was at first supposed, and I only propose to mention the more important of them:

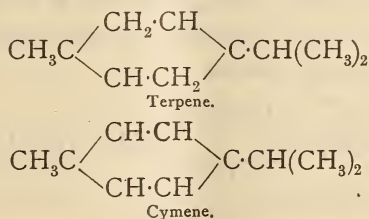
*Pinene* is contained in German and American oil of turpentine, oils of juniper, eucalyptus, sage, etc., and is obtained by distillation.

*Limonene* is found in oils of lemon and orange peel, oil of dill, oil of caraway, oil of bergamot, etc.

*Silvestrene* occurs chiefly in Swedish and Russian oil of turpentine.

*Phellandrene* occurs in eucalyptus oil, elemi and fennel, and is distinguished from others by forming a crystalline compound with  $\text{HNO}_2$ . These different terpenes often exist in dextro-rotatory and lævo-rotatory forms, and often by a mixture of these we may get inactive bodies. Wallach has separated them and identified them by formation of their hydrochlorides, bromides and nitrites.

They have not yet been synthesized, and their chemical constitution is not quite settled, but they are probably isomerides of dihydromethylisopropyl benzene, or dihydrocymene:



Though cymene has been prepared synthetically by Widman, from 1:4 bromcumene and  $\text{MeI}$  (*Ber.*, xix), it has not yet been found possible to hydrogenate it and produce the terpenes.<sup>1</sup>

<sup>1</sup> Since the above was in type, Baeyer claims to have synthesized dihydrocymene (*Ber.*, 26, 232).

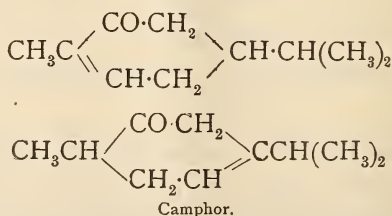
The terpenes, then, are a class of bodies of formula  $(C_5H_8)_n$ , of the probable composition dihydroparacymene, and exist in a number of isomeric forms which are identified by the compounds they form with bromine, hydrochloric and nitric acids.

I have treated of the terpenes in a very cursory way, but as my time is limited I must now pass on to consider the next group ( $\gamma$ ), the members of which are generally the aromatic constituents of the oil. Of late, much light has been thrown on these constituents, but much remains to be done; but here, as in the terpenes, it is probable the number of substances present is actually less than was at first supposed. Since the camphors as a class are very much allied to the terpenes, I shall treat those first.

They include camphor, Borneol camphor, menthol and thymol. Of these we have:

$C_{10}H_{16}O$	.....	Camphor, thymol, carvacrol.
$C_{10}H_{18}O$	.....	Borneol camphor and cineol.
$C_{10}H_{20}O$	.....	Menthol.

The constitution of camphor is still an open question amongst chemists, and several formulæ have been proposed for it. It has not yet been synthesized from cymene, to which it certainly bears a very close relation. The facts that camphor combines readily with HCN, phenyl hydrazine, and  $NaHSO_3$ , and that on oxidation it yields camphoric acid, and also that by treatment with  $ZnCl_2$  and other dehydrating agents we get as a chief product paracymene, tend to show that it is a ketone of which Borneol camphor is the secondary alcohol, as camphor on reduction with Na yields Borneol camphor, which, on oxidation, yields camphor. There are several objections to this view, but Cazeneuve, in a masterly review of the whole state of our knowledge on this subject (*Bull.* [3], ix, x, 38), ascribes to it the formula:



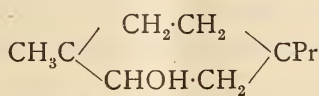
Thymol—one of the official stearoptens, occurs in ajowan and other oils. It is probably a tertiary alcohol, and is metahydroxycymene 1, 3, 4.



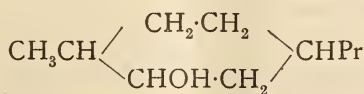
Carvacrol, readily obtained from camphor and a constituent of Spanish hop oil, is isomeric with thymol, but is the ortho-derivative.

Borneol camphor is supposed to be a secondary alcohol, and on oxidation yields camphor, but in the unsatisfactory state of our knowledge concerning camphor little reliance can be placed on this formula.

Cineol, having the same empirical composition as the above, exists in many oils, but has been disguised under different names; it is an anhydro body and is identical with eucalyptol, cajeputol, etc., and is found in the oils of wormseed and *Lavandula Spicata*.



Borneol Camphor.



Menthol.

Menthol,  $\text{C}_{10}\text{H}_{20}\text{O}$ —this body, so largely used in pharmacy nowadays, is a secondary alcohol, and on oxidation yields a ketone, which with sodium may be again converted into menthol.

These bodies, either ketones or secondary alcohols, bear a very close relation to the terpenes and to paracymene, but their constitution has not yet been verified by their synthetical formation, and the formula of camphor must be received with very great caution.

We have thus left a number of the aliphatic compounds and phenol derivatives of varied composition. I first propose to take a group of bodies very closely related to each other, which are found in many essential oils, but I must again remind you that our knowledge on this subject is somewhat meagre, and systematic investigation into their constituents has only been undertaken within the last few years.

Many oils are omitted on account of insufficient data from which to generalize.

The group that I shall take includes the aldehydes, alcohols, ketones and alkyl salts—all related to each other and often found in the same plant.

Of these several have the same empirical composition as the

camphor group we have just discussed, but differ from them in being open chain compounds. They are:

$C_{10}H_{16}O$ , . . . . . Citral or geraniol aldehyde.

$C_{10}H_{18}O$ , . . . . . Citronellic aldehyde.

Rhodinol.

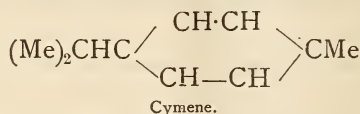
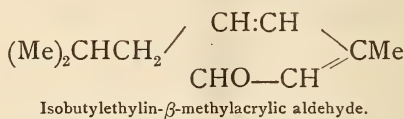
Geraniol identical with linalool, coriandrol and aurantiol.

$C_{10}H_{20}O$ , . . . . . Citronellic alcohol.

These are pretty widely distributed, and occur generally associated with terpenes in a good many oils.

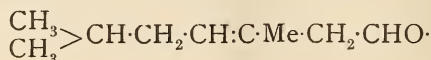
*Citral*.—This is found in oils of orange peel, lemon, lemon grass, citronella, eucalyptus, etc., and can be prepared by oxidizing geraniol, to which it bears a very simple relation, viz: that of aldehyde to alcohol.

It is readily converted by heat into cymene, and the following formula has been assigned to it:



*Geraniol*.—The alcohol corresponding to citral occurs in a good many oils and has been given different names, but it is identical with linalool, coriandrol, and possibly aurantiol and rhodinol. It is found, to a large extent, in the Indian grass oils (92 per cent.), andropogon, lemon grass, Indian or Turkish geranium, ginger grass and vetivert, in lavender, coriander, linaloe, petit grain and bergamot.

Citronellic aldehyde exists in large quantity in oil of citronella, and is isomeric, but not identical with Borneol and geraniol. On reduction it yields citronellyl alcohol, which is also found in citronella oil, and their constitution is supposed to be  $\beta$ -methyl  $\sigma$ -isobutylallylacetaldehyde—



with the alcohol  $\text{CH}_2\text{OH}$  replacing CHO in the formula for citral.

*Rhodinol*, isomeric with geraniol, is the elæoptene contained in rose oil, and may be represented by  $\alpha$ -propyl  $\sigma$ -propylcrotonylene-methylcarbinol—



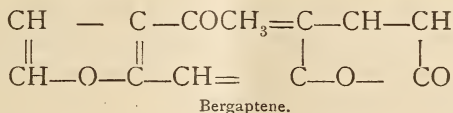
These bodies, though of same empirical composition as the camphors, differ greatly from them, but they are very closely allied to each other. They exist in plants of widely different orders, and, no doubt, further research will prove them to be contained in other oils. Closely allied with them in the oils are the alkyl salts of these alcohols—generally the acetate.

Geraniol acetate,  $\text{C}_{10}\text{H}_{17}\text{CH}_3\text{CO}_2$ , occurs in oils of lemon, bergamot, linaloe and lavender; and aurantiol acetate, either identical or isomeric with the above, in oil of petit grain. These we should expect to be fragrant bodies, recalling the alkyl salts of amyl and valerian, and in *A. nobilis* we have amyl and butyl tiglinates and angelicates with other alkyl salts. This I think is a fair and general account of the bodies belonging to the aliphatic series, and before passing to the phenol compounds, I shall give an example of the constituents of an oil showing how my generalization applies.

Oil of bergamot (*Citrus Bergamia*) contains:

40 per cent.	limonene	} terpenes described under that head.
10	" dipentene	
25	" geraniol—alcohol $\text{C}_{10}\text{H}_{18}\text{O}$ .	
20	" geraniol acetate.	
5	" bergaptene.	

Bergaptene is a body supposed to be the lactone of bergaptenic acid, a body allied to coumarin, and would be represented thus:



We see, therefore, in this oil the terpenes, alcohol and alkyl salt, and another body in very small quantity and possibly formed from others.

I now pass on to those constituents which belong to the benzene group proper, though thymol described under camphors really comes under this category, but most of them may be regarded as derived from benzene rather than paracymene.

The most important are :

*Anethol*,  $C_{10}H_{12}O$ , which occurs in oils of fennel, aniseed, pimpinella and star anise.

*Eugenol*,  $C_{10}H_{12}O_2$ , which occurs in oils of cloves, cinnamon, sassafras, canella and pimento.

*Methoxychavicol*,  $C_{10}H_{12}O_2$ , is found in dried betel leaves.

*Safrol*,  $C_{10}H_{10}O_2$ , occurs in oil of sassafras.

*Carvol*,  $C_{10}H_{14}O$ , in oils of dill and caraway.

Cinnamyl aldehyde and acetate, in oil of cinnamon. All these are well known bodies, their constitution has been determined, except carvol, about which there is some doubt.

Anethol is 1·4 methoxyallylbenzene.

Eugenol is 1·2·3· methoxyallylphenol.

Methoxychavicol is 1·2·4· methoxyallylphenol.

Safrol is eugenol — $H_2$  and contains a methylene group.

Carvol is keto-dihydrocymene, and is more nearly allied to the cymene group, with which, properly speaking, it should be placed.

Cinnamyl aldehyde and acetate, of course, are well known, and do not need to be described here.

The very close connection between anethol, eugenol and safrol is worthy of notice, as all are derivatives of methoxyallylbenzene, and bear a close relation to each other. With these I finish the second section of my paper, and though I have only skimmed over the surface of the subject, I trust I have not made any great omissions. To summarize—the constituents of most oils are terpenes of  $(C_5H_8)_n$  mixed with the substance to which the odor is due, which may be alcohol, ketone, aldehyde, alkyl salt or phenol derivative. In many cases alkyl salts are present, and to them very often the odor is due, but it is to be hoped that a thorough investigation will be made into the constituents of the oils. Much has been done in this direction, notably by Semmler, and soon, I trust, our imperfect knowledge will be much extended.

## A NEW METHOD FOR DETERMINING THE FATTY MATTER OF MILK.

BY LEO LIEBERMANN AND S. SZÉKELY.

Fifty cc. milk at the temperature of the room are put in a glass cylinder about 25 cm. in height and about  $4\frac{1}{2}$  cm. internal diameter ; there are added 5 cc. of potassa-lye at 1·27 specific gravity, closed with a well-fitting cork, and well shaken.



To this mixture are added 50 cc. of a light petroleum ether, the specific gravity of which is about 0.663, the boiling-point 60°, and which evaporates on the water-bath without residue. The glass is stoppered and again vigorously shaken so as to form an emulsion. To this emulsion are added 50 cc. alcohol of about 95.8 to 96 per cent., and the liquid is again well shaken. After at most four or five minutes the petroleum ether separates at the top, and the separation may be regarded as complete. We shake again three or four times, each time for a quarter of a minute, allowing each time the ether to separate out.

The petroleum ether will now have taken up all the fat. We ascertain this point by shaking up eleven specimens a different number of times, the first once and the eleventh eleven times. Already after the third or fourth shaking we have found quantities of fat which differ from each other only to an unimportant degree. After once shaking 3.535 per cent., after twice shaking 3.54 per cent., and the results which we obtained between the third and eleventh shaking fluctuated only between 3.55 and 3.56 per cent.

Of the stratum of petroleum ether, 20 cc. are drawn off with a pipette and introduced into a small tared capsule, the capacity of which is about 40 to 50 cc., and the neck of which is higher than 1 cm., with a diameter of  $1\frac{1}{2}$  to 2 cm. These small flasks are convenient, because the liquid does not readily rise out of them, and yet the evaporation goes on with sufficient rapidity. But of course small tared beakers or ordinary flasks may be used.

The flask is set upon a water-bath at a moderate heat, the petroleum ether is evaporated entirely away, and the residue is dried at from 110° to 120°, for which an hour is generally sufficient; the weight found, if multiplied by 5, gives the quantity of fat in 100 cc.

The quantities of fat obtained by the new method may be easily recalculated by the aid of the specific gravity into percentages by weight, so as to admit of a comparison with the Adams method, in which the milk is weighed. We remark that on the Adams method the extraction with petroleum ether must last for at least 3 hours.

The results of the new method vary from those of the gravimetric method by 0.066 in a positive direction, and by 0.037 per cent. in a negative direction. But these deviations, in our opinion, are not necessarily founded on the sources of error in the method, but are

chiefly due to the circumstance that in the gravimetric method the milk is weighed, whilst in the new method it is measured, and that the recalculation may occasion errors.—*Zeitschrift f. Anal. Chemie*, xxxv, p. 168, from *Chem. News*, 1893, 281.

## ATTEMPT AT A GENERAL METHOD OF CHEMICAL SYNTHESIS.

BY RAOUL PICTET.

In order to develop from the totality of facts explained in my former papers a practical method of utilizing low temperatures in chemical syntheses, it will be useful to recall the partial laws which we have already seen.

The fundamental hypothesis which has guided us and the experimental verifications have enabled us to establish eight laws:

(1) At very low temperatures, below  $-130^{\circ}$ , no chemical reaction takes place, whatever substances are present.

(2) All chemical reactions are manifested spontaneously at a certain temperature and under a certain pressure exerted upon the constituents; this is the temperature limit.

(3) The same reactions may be obtained below the temperature limit if we apply auxiliary energy by the use of electric currents or discharges.

(4) Exothermic reactions always present two phases: in the former we retain a control of the temperatures if we can remove from the combining bodies, by radiation as much heat as is produced at the same moment by the simultaneous effect of the affinities of the extraneous energies introduced into the substances. In the second phase, the temperature rises suddenly until the reaction takes place above the temperature limit.

The first phase is the reaction limit. The second phase is the reaction in mass.

(5) Endothermic reactions are always limit reactions.

(6) The dissociation of the products obtained by exothermic reactions corresponds to the laws of endothermic combinations and reciprocally.

(7) The temperature limit of chemical reactions is not in a known simple relation with the apparent energy of the phenomenon. On the contrary, the quantities of heat liberated seem to class the

ascending order of the temperature limit, especially in one and the same family of substances.

(8) The electric spark and current seem to be the best media for supplying extraneous energy to limited chemical reactions.

With these eight partial laws we may establish a complete scientific programme for the discovery of a general method of chemical synthesis.

We begin by bringing in contact the simple bodies, and defining experimentally the laws which govern their combinations, the relations between their temperatures, the pressures, and the quantities of heat to be supplied in limited reactions.

As this first series of observations must, on principle, give precise numerical values, we must never allow reactions in mass to interfere, as they disturb and modify the thermic conditions of the phenomenon. This condition, *sine qua non*, indicates at once the plan of operations to be followed. The chemist must have at command a powerful refrigeratory apparatus, by which he can at least reach temperatures of  $-130^{\circ}$  to  $-150^{\circ}$ , so as to paralyze all chemical reaction. Substances thus cooled are certainly below all the temperature limits.

The refrigerating tank must have a temperature which can be regulated at will from  $-130^{\circ}$  to the ordinary temperature.

A powerful induction coil yields sparks which must be made to strike, by means of insulated conductors through the substances to be combined, in the refrigerated enclosure.

When the reaction commences, the heat produced each moment by the weight of the compounds obtained must be withdrawn by radiation, so that the temperature at which the reaction is produced may be kept constant.

The quantities of energy represented by the electric current in ampères and volts are equivalent to the endothermic phase of the reaction. The quantities of heat lost by radiation measure the exothermic phase.

The calorimetric measure effected in the refrigeratory enables us to know directly the effect of radiation for all the differences of temperature.

We shall on this principle constitute the first rational dynamic table in chemistry, by studying all the simple bodies, two by two, three by three, etc. By combining by the same methods, and with

the same appliances, the binary bodies with the simple bodies, we obtain the second dynamic table. Next we pass to the ternary substances, etc.

The successive experiments will discover the laws which govern the phenomena, and will in so far facilitate the knowledge of the utilization of the dynamic tables.

The line of the greatest chemical declination of all bodies will thus be determined experimentally.

Chemical reactions will be defined in a manner as precise and certain as the fall of a body on an inclined plane by a single track without ambiguity. We shall know beforehand, for any reaction which we may wish to produce, all the conditions to be fulfilled so as to obtain only a single effect, *e. g.*, the fixation of a new element upon a given primitive nucleus.

The track will be known and the result certain. Under this form we see the possibility of forming rationally by direct synthesis all the substances in nature.

It is probable that along with the electric spark we may utilize other sources of auxiliary energy, *e. g.*, the collateral chemical reactions produced in the series of substances studied, and which will yield a known number of calories. The subject of this immense research is scarcely touched upon; we have confined ourselves to lay down its principal lines.

The present experimental results give a preliminary sanction to this programme.

In concluding the exposition of these general views on the phenomena of ponderable matter, we see that the same equations of motion may represent as a simple function of distances:

(1) All astronomy and the phenomena of gravitation, the distance of bodies which attract each other, passing from infinity to distances where the action of the ether manifests itself to modify the law of Newton.

(2) All cohesion where the totality of the physical phenomena of changes of state linked to calorific phenomena where the distances of the attracting bodies pass from the limits of gravitation to the distance of bodies refrigerated to the absolute zero.

(3) All chemistry, phenomena of motion, when the distance of the attracting bodies is smaller than that observed at the absolute zero.



The equations of the movement of matter permit us thus to reduce these three sciences to a single formula, the numerical terms of which are not yet known, but from which we may logically deduce every observable phenomenon.—*Comptes Rendus*, cxvi, p. 1057, from Chem. News, 1893, 279.

## CONVERSION OF ACONITINE INTO ISACONITINE.<sup>1</sup>

BY WYNDHAM R. DUNSTAN, M.A., F.R.S., AND FRANCIS H. CARR.

From the Research Laboratory of the Pharmaceutical Society.

In a previous communication it has been shown that the roots of *Aconitum Napellus* contain, besides the highly poisonous aconitine, an almost non-poisonous isomeride isaconitine. The constitutional relationship of the two alkaloids is evidently an intimate one, since each alike furnishes the same hydrolytic products, viz: aconine and benzoic acid. The authors now show that when *aconitine hydrobromide* (m. p. 163°) is heated in aqueous solution it very gradually changes into the isomeric *isaconitine hydrobromide* (m. p. 282°). The change is facilitated by the presence of a small quantity (1–2 per cent.) of free hydrobromic acid, but is not assisted if sufficient is present to induce hydrolysis of a large proportion of aconitine.

The isaconitine was identified not only by the high melting point of its salt, but also by the formation and analysis of the characteristic auchlorisaconitine. No similar change could be detected in *aconitine nitrate* when this salt is heated either in neutral or acid solution, neither could the conversion be effected by heating aconitine with glacial acetic acid, although in this case anhydro-aconitine is produced if the heating is continued for eighteen hours at 120°. Dissolution of aconitine in concentrated sulphuric acid fails to convert it into isaconitine, even after gently heating, and aconitine sulphate does not appear to undergo any conversion when it is heated for many hours in contact with very dilute sulphuric acid. No isaconitine seems to be produced during the hydrolysis of aconitine by cold soda solution. The authors are making further experiments in the hope of gaining information with regard to the mechanism of the conversion of aconitine hydrobromide into isaconitine hydrobromide.

<sup>1</sup> The substance of a communication made to the Chemical Society on June 15. Reprinted from Pharm. Jour. Trans., June 24, 1893, p. 1045.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

*The Kansas State Pharmaceutical Association* met in its fourth annual meeting at Wichita, May 23. A large number of papers were read, among them the following: Percentage of moisture and extractive in crude drugs, by D. C. Liemance; estimation of colchicum preparations, by E. F. Walleck; drug and plant analysis, and insects injurious to drugs, by L. E. Sayre; aseptol, by L. H. Bergman; and the quality and coloring power of commercial pigments, by M. Noll. The officers for the ensuing year are: F. W. Atkins, Girard, president; Mrs. M. O. Miner, Hiawatha, secretary; H. W. Spangler, Perry, treasurer. The next annual meeting will take place at Salina.

*The Kentucky Pharmaceutical Association* was called to order by President Geier on May 23, in Louisville, Ky., where it was convened in its sixteenth annual meeting. The first session was taken up with addresses of welcome, president's address, and committee reports; and was followed by the reading of papers and election of officers, which resulted as follows: President, Robt. J. Snyder, Louisville; secretary, J. W. Gayle, Frankfort; treasurer, Wm. Morris, Paris. The Association will meet again in May, 1894, in Paris; the local secretary being C. J. Clark.

*The Louisiana Pharmaceutical Association* was called to order May 2, by president L. F. Chalin, in New Orleans. Besides the president's address and the various committee reports, the association listened to an interesting paper on "Deterioration of Drugs" by J. H. Storck. The newly elected officers are: President, P. A. Capdeau; corresponding secretary, J. A. Legendre; recording secretary, Mrs. E. Rudolph, and treasurer, E. Lalmant, all of New Orleans.

*The Minnesota State Pharmaceutical Association* met in its ninth annual meeting at Hotel St. Louis, Lake Minnetonka, June 13 and 14, President C. R. J. Kellam in the chair, who in his annual address expressed his views of pharmaceutical legislation in the State. Various reports and papers were submitted, among which latter, was one by F. J. Wulling on the pharmacal profession, and two by L. A. Harding, on "the relation of chemistry to pharmacy" and "glycerin suppositories." The officers for the ensuing year are J. E. Stiles, president, and Chas. T. Heller, secretary and treasurer. The next meeting place will be Lake Minnetonka and the date June 12-13, 1894.

*The Mississippi Pharmaceutical Association*, at its annual convention in Jackson, May 9, discussed various topics bearing on Pharmaceutical legislation, and after their routine business was disposed of, elected the following officers: H. F. West, president; Carson Lemly, secretary, and O. Lillybeck, treasurer. The next meeting will take place in Jackson, in May, 1894.

*The New Jersey Pharmaceutical Association* convened in Atlantic City on May 24, and listened to various addresses, in addition to the regular routine. The following officers were elected: E. B. Jones, Mount Holly, president; W. C. Alpers, Bayonne, secretary, and Wm. M. Townley, Newark, treasurer.

*The Pennsylvania Pharmaceutical Association* held its 16th annual meeting, June 13-15 at Eureka Springs, Saegertown (near Meadville).

The place chosen was a delightful one upon the banks of French creek, and the

hotel accommodations were excellent. The number present was less than usual, owing to the World's Fair, and the distance from the central and eastern portions of the state, but the number of new members taken in (40) was greater than for several years. The officers elected to serve the ensuing year are William McIntyre, Philadelphia, President; Dr. W. H. Reed, Norristown, 1st Vice-President; H. C. Murto, Pittsburg, 2d Vice-President; Jos. L. Lemberger, Lebanon, Treasurer; Dr. J. A. Miller, Harrisburg, Secretary; W. S. Seabold, Annville; Wm. Sweely, Williamsport, and A. H. Durham, Reading, Executive Committee.

The committee on legislation reported that they had been successful in their endeavor to have the section of the pharmacy law repealed which allowed physicians to register without undergoing an examination.

Among the papers read was one on *syrup of cimicifuga*, by S. W. Heinitsh, in which the author gives the following formula for this syrup, as being easily prepared, pleasant and desirable:

Powdered Cimicifuga (No. 60),  $\bar{3}$ iv Troy.  
 Diluted alcohol, q. s.  
 Carb. magnesia,  $\bar{3}$ ij Troy.  
 Sugar (granulated),  $\bar{3}$ xiv Troy.  
 Water, q. s. f  $\bar{3}$ xvi.

Exhaust the powder with diluted alcohol, evaporate the tincture to 8 fl. oz., triturate with the magnesia, filter and dissolve the sugar in the filtrate without heat.

*The manufacture of linseed oil*, by various processes, was explained in a paper by Dr. Reed. The bisulphide of carbon method is as follows: The seed is crushed, packed in percolators, and the solvent poured upon it. The menstruum dissolves the oil and the solution is caught below in proper receptacles. The solvent is reclaimed by distillation and condensation, and the oil remains behind. By this process the seed is thoroughly exhausted, but the disadvantages are the inflammable nature of the menstruum, the odor imparted by it to the oil, and the odor and taste of the cakemeal, which impairs its market value.

The old method of expression is as follows: The seeds are crushed between two large stones, weighing over two tons each, in an old style chaser mill. By this means it is difficult to crush all the seeds at the first grinding, so the cake is subsequently reground. The meal, under constant stirring, is now warmed over a specially constructed furnace, it is then placed in press bags, knit of heavy woollen yarn, folded within a leather book and pressed in what is known as a wedge press, allowing the mass to remain squeezed for a short while. The cake is then removed, reground, and a second pressing removes all or nearly all the oil from the mass. The oil from the drip pans is then emptied into a large tank and allowed to settle. The yield of oil is about 17 pints to a bushel of seed, or about 28 per cent. by weight. In the more improved method, by expression, the seed is ground in roller mills driven by steam power. It is fed to the rolls automatically and crushed fine, then collected, transferred to steam "jacket pans," and under constant stirring heated to 200° F. The heated crushed seed is now placed in camel's hair pockets or jackets having the shape of a good sized towel, placed on a specially constructed



table and smoothed evenly throughout. The jackets are now laid on the press bed and hydraulic pressure of 4,000-6,000 lbs. to the square inch applied. The yield of oil is about 18 pints from a bushel of seed, but if heating the ground seed be omitted, not more than half the usual percentage will be secured.

On Wednesday evening a concert was given by the principal and pupils of the Meadville Conservatory of Music, followed by various other entertaining and amusing features. On Thursday afternoon, the druggists of Meadville tendered the association an excursion on Lake Conneaut, and a banquet at the Lake House.

The next meeting of the association will be held at the Neversink Mountain House, Reading, Pa., on the second Tuesday of June, 1894.

*The Tennessee Druggists' Association* met in Nashville, May 16. The three sessions held were taken up with addresses, the presentation of various reports and the reading of papers, among which was one by Prof. Ruddiman, on the testing of medicines by the retailer. The officers for the ensuing year are: J. O. Burge, Nashville, president; Will Vickers, Murfreesboro, secretary; and J. F. Voight, Chattanooga, treasurer. The next meeting will be held in Chattanooga, May 28, 1894.

*The Texas Pharmaceutical Association* met in fourteenth annual convention at the Oak Bluff Opera House, Dallas, May 9. Ex-Mayor Frank Oliver welcomed the Association, and President Burgheim, in his annual address, spoke of the "Necessity of our Union." At the second day's session, reports were received, papers read and the following new officers elected: President, L. Myers Connor, Dallas; secretary, Geo. Heyer, Houston, and treasurer, W. F. Shook, Dallas. Next year the association will meet at Austin, on the second Tuesday of May.

*The Utah Pharmaceutical Association*, which met in convention at Ogden, May 9, was called to order by President Farlow. The visitors were welcomed by Dr. F. B. Hurlbut, and after the president's address, various reports were received, and a resolution, affecting registration without examination, was adopted. Several papers were read, and it was decided to hold the next annual meeting in Provo, on the second Tuesday in June, 1894; Herbert Pyne was elected local secretary. S. P. Ash, Ogden, was elected president; secretary C. H. McCoy was re-elected, and the newly chosen treasurer is H. A. Walker, Ogden.

*The Washington State Pharmaceutical Association* was called to order May 8, at Spokane, president A. W. Stewart in the chair. After the address of welcome by R. Easson and the response thereto by S. O. Harmon, the president delivered his annual address. Beside the routine business, various reports were submitted, and the officers elected are: A. M. Doland, Spokane, president; Walter St. John, Tacoma, secretary; James Lee, Seattle, treasurer. The next meeting will take place at Tacoma, on the third Monday of May, 1894.

*The Massachusetts College of Pharmacy* held its annual graduation exercises on Wednesday evening, May 24, 1893, in Association Hall of the Y. M. C. A. building. The degree was conferred upon twenty-five graduates.



*The National College of Pharmacy* held its commencement exercises on Wednesday evening, May 10, in Metzertott's Music Hall, Washington, D. C. The graduates, ten in number, were addressed by the Rev. A. G. Rogers.

*The Louisville College of Pharmacy* held its commencement exercises on Tuesday afternoon, July 11, 1893, in Harris Theatre, Louisville, Ky. The degree of Ph.G. was conferred on fourteen graduates.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*A Practical Treatise on Materia Medica and Therapeutics*, with Especial Reference to the Clinical Application of Drugs. By John V. Shoemaker, A.M., M.D., Professor of Materia Medica, Pharmacology, Therapeutics, and Clinical Medicine, and Clinical Professor of Diseases of the Skin in the Medico-Chirurgical College of Philadelphia, etc. Second Edition. Revised. In two royal octavo volumes. Volume I, 353 pages; devoted to Pharmacy, General Pharmacology, and Therapeutics and Remedial Agents not Properly Classed with Drugs. Volume II, 680 pages: An Independent Volume upon Drugs. Volume I, in Cloth, \$2.50 net; Sheep, \$3.25 net. Volume II, in Cloth, \$3.50 net; Sheep, \$4.50, net. Philadelphia: The F. A. Davis Company, Publishers.

The first volume is divided into two parts of which the first is entitled "Pharmaceutical Remedies or Drugs," and contains information on the Pharmacopœia, its nomenclature, classes of preparations, etc.; on pharmaceutical manipulations; on prescription-writing; a syllabus on poisons and their antidotes, and an exposition on the classification of medicines. Part II treats of those remedies and expedients in medicines, which are not classed with drugs or pharmaceutical preparations, such as electricity, massage, heat, cold, diet, etc. The scope and arrangement of the second volume of this work has been fully described in our volume for 1891 (p. 320). In the second edition, now before us, the introductory portion, relating to the classification of medicines, has been omitted, since this properly belongs to, and is contained in, the first volume. The drugs and chemicals, as heretofore, are considered in alphabetical order. Some of the articles, like antipyrin and tuberculin, have been entirely rewritten. New articles have been added, like phenocoll, thallin and xanthium; but most of the new articles, including most of the synthetical remedies, have found a place in the appendix, to which also some drugs have been removed, which were formerly in the general list, like apocynum, areca, bryony and vanilla.

The work has been written and revised by a physician for the use of physicians, who will find it of much service and to be readily consulted, each volume being provided with a general index and a clinical index, all bearing evidence of the care bestowed upon their preparation.

*On the Prevention of Blindness.* Addressed to physicians, nurses and midwives.

Circular 35 of the Pennsylvania State Board of Health treats of ophthalmia of the new born, and the means to prevent it. The circulars may be obtained by application to the Secretary of the Board, 1532 Pine Street, Philadelphia, enclosing a 2 cents (or for the entire series 4 cts.) postage stamp.

*Surgical Dressings, aseptic and antiseptic.* By Seward W. Williams, Ph.C., F.C.S. Pp. 23.

A reprint from the *Pharmaceutical Record*, April 6, 1893.

*Proceedings of the Utah Pharmaceutical Association*, at the first meetings held April 6 and Oct. 4, 1892, in Salt Lake City. Pp. 54.

On p. 387, of our last volume, we reported the organization of this Association; at the adjourned meeting trade matters furnished the subjects for discussion.

*American Orthopedic Association.* Address of the president, Benj. Lee, M.D., Philadelphia. Pp. 8.

The address is chiefly devoted to inflammation of cartilage.

*Diet for the Sick.* By Miss E. Hibbard, Principal of Nurses Training School, Grace Hospital, Detroit, and Mrs. Emma Drant, Matron of Michigan College of Medicine Hospital, Detroit, to which has been added Complete Diet Tables for various diseases and conditions, as given by the highest authorities. Detroit, Mich., The Illustrated Medical Journal Co., publishers. Paper, 81 pages. Price, postpaid, 25 cents; 6 for \$1.00.

This little book is intended to give instructions for the preparation of food for the sick; and indicates also the kind of diet recommended or prohibited by certain prominent physicians in various diseases. The instructions are plain and easily carried out and the receipts appear to be practical.

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## OBITUARY.

*Dr. David Hunter*, Ph.G., Class 1874, died at his late residence, No. 141 N. 20th St., June 16, 1893, of pleuro-pneumonia.

He was in business at Atlantic City at one time and later on at 38th and Aspen Sts., but at the time of his decease was practising his profession. He was a brother of Dr. Thomas Hunter, Ph.G., of 15th and Wharton Sts.

*Edmund Pollitt*, Ph.G., Class 1848, died at his late residence, No. 2017 N. 8th St., of apoplexy, July 1, 1893; was found dead in his bed. He was in business for a number of years at Front and Christian Sts., this city, after which he was with Wm. Snowden, 4th and Noble, until his death, but during the last 9 or 10 years and at the time of his death was assisting Mr. David S. Ferguson, 2200 Frankford Ave.



# THE AMERICAN JOURNAL OF PHARMACY

SEPTEMBER, 1893.

## ON THE COMPOSITION OF AMERICAN PENNYROYAL OIL.<sup>1</sup>

BY CHAS. J. HABHEGGER.

In a paper read before the American Pharmaceutical Association in 1887, Dr. Edward Kremers showed that the American pennyroyal oil, after saponification with caustic potash, yielded two fractions of like empirical composition,  $C_{10}H_{18}O$ . In 1891,<sup>2</sup> he showed that these two fractions although of widely differing boiling points  $168-171^{\circ}C.$  and  $206-209^{\circ}C.$  respectively, were both ketones yielding similar oximes one of which was probably menthoxime.

In the year following,<sup>3</sup> further experiments were made in the same direction without, however, coming to as satisfactory a conclusion as might have been desired. The work was to have been continued during the past year, but it was impossible to obtain a reliable specimen of American pennyroyal oil in sufficient quantity.

As Mr. Witte<sup>4</sup> states in his thesis, experiment had already indicated that the American pennyroyal oil contained pulegone, and that the two substances,  $C_{10}H_{18}O$  are reduction products of the same. Beckmann and Pleissner<sup>5</sup> state, it is true, that they have not succeeded in obtaining crystalline pulegoneoxime from American or Algerian pennyroyal oil. To ascertain, definitely, whether the

<sup>1</sup> Read at the meeting of the Wis. Pharm. Assoc., Fond du Lac, August, 1893.

<sup>2</sup> Phar. Rundschau, Band IX, p. 130.

<sup>3</sup> Proc. Wis. Pharm. Assoc., 1892, p. 55.

<sup>4</sup> Ibidem, 1892, p. 55 and 59.

<sup>5</sup> Ann. d. Chem., Bd. 262, p. 37.

American oil contains pulegone or not, the following study was undertaken.

#### PULEGONEOXIME.

The difficulties in preparing the oxime, from the American oil, were overcome by proceeding in the following manner: To 20 parts of the oil, 12 parts of hydroxylamine hydrochlorate, with 14 parts of sodium bicarbonate, and a mixture of 30 parts of ether and 10 parts of alcohol are added. The mixture was allowed to stand overnight, and then heated for two hours on a water-bath, and filtered while hot. Almost immediately crystals of the oxime appeared.

A number of modifications of this process had previously been tried, only one of which was successful, besides the above mentioned. The modification in this case consisted in heating the mixture for one hour, before allowing it to stand overnight. The crystals of oxime obtained melted at 137–138° C. The melting point was raised to 147° C. by recrystallization, from a mixture of three parts of ether and one part of alcohol.

Dried over calcium chloride this oxime, corresponding in appearance to pulegoneoxime of Beckmann and Pleissner,<sup>1</sup> yielded upon analysis the following results:

(I) 0.2946 grams of the substance yielded,  $0.6980, \text{CO}_2 = 0.1903 \text{ C}$   
and  $0.2856, \text{H}_2\text{O} = 0.0317 \text{ H}$

(II) 0.2184 grams of the substance yielded,  $0.5196, \text{CO}_2 = 0.1417 \text{ C}$   
and  $0.2044, \text{H}_2\text{O} = 0.0227 \text{ H}$

(III) 0.1878 grams of the substance yielded,  $0.4438, \text{CO}_2 = 0.1210 \text{ C}$   
and  $0.1818, \text{H}_2\text{O} = 0.0202 \text{ H}$

(IV) 0.1382 grams of the substance yielded 10.2 cc. of nitrogen under a barom. pressure of 728 mm., and at a temperature of 21° C. = 0.0111 grams nitrogen.

(V) 0.1964 grams of the substance yielded 15 cc. of nitrogen under a barom. pressure of 743 mm., and at a temperature of 19° C. = 0.0168 grams nitrogen.

	Calculated for $\text{C}_{10}\text{H}_{16}\text{NOH}, \text{H}_2\text{O}$ .	Obtained.				
		I.	II.	III.	IV.	V.
C, . . . . .	64.86	64.59	64.88	64.43	—	—
H, . . . . .	10.27	10.76	10.39	10.75	—	—
N, . . . . .	7.57	—	—	—	8.03	8.57
O, . . . . .	17.30	—	—	—	—	—

From the above results, it will be seen, that no doubt can exist,

<sup>1</sup> Ann. d. Chem., Bd. 262, p. 6.



as to the identity of this compound with the pulegoneoxime obtained by Beckmann and Pleissner,<sup>1</sup> from the oil of *Mentha Pulegium*, the Spanish Pennyroyal oil. Its action toward polarized light also agrees very well with that of the pulegoneoxime of Beckmann and Pleissner.<sup>2</sup>

$$\begin{array}{r} S \text{ 1.2390 grams} \\ L \text{ (ether) 35.5144 grams} \\ p. \text{ 3.48 p. c} \\ t. \text{ 20}^{\circ} C \\ d. \text{ 0.751} \\ l. \text{ 1 d.m.} \\ a - \text{ 2.33}^{\circ} \\ \hline [\alpha]_D = -88.77 \end{array}$$

Beckmann and Pleissner found  $[\alpha]_D = -83.44$ .

#### THE BENZOYLESTER OF PULEGONEOXIME.

Beckmann and Pleissner<sup>3</sup> prepared a benzoylester by adding to two parts of the pulegoneoxime a solution of two parts of benzoylchloride in ten parts of ether. After the ether has evaporated, the residue is treated with sodium hydroxide in the cold, when the ester will congeal to a white plastic mass. This can be crystallized from dilute alcohol, or from a mixture of benzene, and that fraction of petroleum benzine boiling at about 50° C. The benzoylester of Beckmann and Pleissner<sup>4</sup> is stated to have been obtained, in colorless needle-shaped crystals, melting at 137–138° C., with the generation of gas.

The benzoylester obtained from one gram of the oxime crystallized only in part in needle-shaped crystals, which were only partially soluble, in the mixture of benzene and petroleum benzin, or alcohol, or ether. The melting points ranged from 137° C. upward. The crystals obtained from the mixture of benzene and petroleum benzin melted at 141° C. Those insoluble in this mixture, even after heating for several hours on a water-bath, melted at 175° C. This discrepancy of the benzoylester can be explained, by

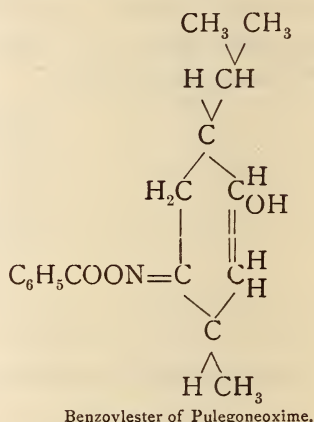
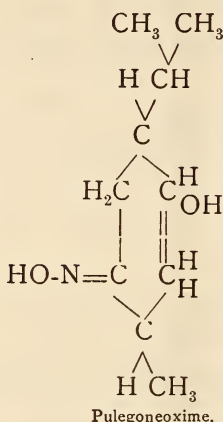
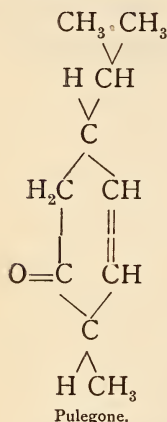
<sup>1</sup> Ann. d. Chem., Bd. 262, p. 7.

<sup>2</sup> Ibidem, p. 8.

<sup>3</sup> Ibidem, p. 10.

<sup>4</sup> Ibidem, p. 10.

assuming that the benzoyl radical replaces the hydrogen of the other hydroxyl group, besides that of the oxyimido group.



A cabinet specimen of American pennyroyal oil, which had been standing for ten years, also yielded pulegoneoxime though not as readily.

The oil used in these experiments had been kindly furnished by Messrs. Fritzsche Bros. of New York.

PHARM. LABORATORY, UNIV. OF WISCONSIN, MADISON.

## OIL OF ERIGERON CANADENSE (Linné).<sup>1</sup>

BY FRITZ W. MEISSNER.

The first investigations of this oil, in regard to its general properties, as well as its boiling point and specific gravity, were made by Procter<sup>2</sup> in 1884. In 1881, Vigier and Cloez<sup>3</sup> made a more careful examination of the oil and determined its specific gravity to be 0.848 at 10° C. and that it boiled between 175–176° C.

They were also the first to ascertain its composition, which they found to be C<sub>10</sub>H<sub>16</sub>. In its action toward polarized light, they found the angle of polarization to be + 16.15°. With hydrogen chloride they obtained a dihydrochloride of the composition C<sub>10</sub>H<sub>16</sub>2HCl.

<sup>1</sup> Read at the meeting of the Wis. Pharm. Assoc., in Fond du Lac, August 1893.

<sup>2</sup> Am. Journ. Pharm., Vol. XXVI, p. 502.

<sup>3</sup> Am. Journ. Pharm., 1881, p. 12, and Journ. de Pharm., IV, p. 236.

Similar results were obtained in 1882 by Beilstein and Wiegand.<sup>1</sup> They found the specific gravity to be 0.8464 at 18° C. and that after drying the oil with metallic sodium it boiled at 176° C. In 1884, Wallach<sup>2</sup> obtained a tetrabromide, a limonene tetrabromide, which melted at from 104–105° C. In 1887, A. M. Todd<sup>3</sup> made several investigations and found the angle of polarization to be —26° to —60°, its specific gravity 0.865–0.855, and its boiling point at 172–175° C. In the same year G. M. Beringer<sup>4</sup> found the specific gravity to be 0.8454 at 15.5° C. In 1887, Flückiger,<sup>5</sup> in a communication from a letter by Todd, states that by the addition of bromine to a cold solution of the oil in glacial acetic acid, he obtained a crystallized compound, limonene tetrabromide,  $C_{10}H_{16}Br_4$ . In September of 1887, Prof. F. B. Power<sup>6</sup> found, in investigations which he made, that the boiling point was at 176° C., the specific gravity 0.8498 at 15° C. and its composition to be  $C_{10}H_{16}$ .

These results are of special value, as well as those of Flückiger, since the specimens of oil examined were distilled for their purpose by Todd. As to the question, which terpene it is, that constitutes by far the largest fraction of oil of *Erigeron Canadense*, the facts rendered by the contributions catalogued would lead to the conclusion that it was one of the limonenes.

The boiling points given by Vigier and Cloez (175–176° C.) by Beilstein and Wiegand (176°) and by Prof. F. B. Power (176° C.) correspond well with the boiling point of pure limonene (175–176°). The dihydrochloride, which Vigier and Cloez obtained, is no absolute proof for limonene, though both limonenes will yield this compound under certain conditions. This dihydrochloride can also be obtained from pinene, from terpineol, from terpin-hydrate, and the other bodies occurring in volatile oils.

The tetrabromides obtained by Wallach, and later by Flückiger, are evidently limonene tetrabromide, as shown by their melting

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<sup>1</sup> Berichte d. Deut. Chem. Ges., 1882, p. 2854, and Am. Journ. Pharm., 1883, p. 372.

<sup>2</sup> Annalen, 227, p. 292.

<sup>3</sup> Am. Journ. Pharm., 1887, p. 302.

<sup>4</sup> Ibidem, p. 285.

<sup>5</sup> American Druggist, 1887, p. 201.

<sup>6</sup> Pharmaceutische Rundschau, 1887, p. 201.

point. Since neither Wallach nor Flückiger paid any attention to the optical activity of the oil, and since literature shows contradicting statements, a final settlement of the identification of the terpene was desirable.

To remove all doubts as to the nature of this terpene, Prof. F. B. Power, in 1890, put at the disposal of Dr. E. Kremers the fraction of 176°, which he had retained from his investigations of 1887. The nitroso chloride reaction, according to Wallach, was made, and limonene nitroso chloride was obtained in sufficient quantity from 5 cc. of the oil. The nitroso chloride was converted into the benzylamine base, which after washing with alcohol and drying, melted at 89–91° C. After one recrystallization the melting point rose to 93° C.

The action of the terpene upon polarized light was determined by a Soleil Ventzhe, of Schmidt and Haeutsch, of which  $1 = 0.3455$  circular degree. Thus  $43.7$  (the number of degrees shown by the instrument)  $0.3455 = 15.098$ .

S 3.84 grams.

L (alc. and chl.) 18.19 grams.

p. = 17.43 per cent.

d. = 0.985.

t. = ?

$\alpha = + 15.098^\circ$

$1 = 1 \text{ d.m.}$

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$(\alpha)_D = + 87.90$

These results leave no doubt as to the nature of the terpene in question. It is dextrogyrate limonene.

The large quantities of resin, which have been repeatedly observed by Todd and others, e.g., in this laboratory, indicate that there is some other substance besides limonene in the oil. What this substance is, still remains to be ascertained. In order to determine, if possible, something more about the composition of *Erigeron* oil, the following investigation was undertaken.

*Experimental Part.*—The oil at my disposal was obtained from Fritzsche Bros., New York. It was the larger portion of that fraction of two kilograms of oil, which distilled below 180° C. Besides this, which was by far the largest fraction, about 200 cc. distilled at 180–185°, 100 cc. from 185–190°, and only a few cubic centimetres in fractions of five degrees each from 190° to 220°. The



residue above 220° was viscid and resinous. The fraction boiling below 180°, of which there were 1053·0 gm. of the specific gravity 0·853 at 15° C., was distilled with water vapors, to free it from the resin, which remained in the flask as a viscid cherry red liquid. The oil was separated from the water and dried at the temperature of the water-bath with caustic potash. The dry oil was then repeatedly subjected to fractional distillation with the aid of a column. The following table gives the fractions obtained, their specific gravity, and action upon polarized light :

	Fract. B. P.	Sp. G. at 20° C.	$\alpha$ for 100 mm.	$(\alpha)_D$ .	Aprox. Amt.
I, . . . . .	170°	0·8521	+ 79·2°	+ 92·9°	50 cc.
II, . . . . .	170-172°	0·8503	+ 82·77°	+ 97·3°	120 cc.
III, . . . . .	172-174°	0·8510	+ 85·79°	+ 100·8°*	250 cc.
IV, . . . . .	174-175°	0·8460	+ 90·64°	+ 107·1°	250 cc.
V, . . . . .	175-176°	0·8476	+ 92·77°	+ 109·4°*	200 cc.
VI, . . . . .	176-178°	0·8450	+ 95·94°	+ 112·35°	75 cc.
VII, . . . . .	178-180°	0·8485	+ 93·34°	+ 110·7°	50 cc.

\* Of fractions III and V the rotatory power of solutions was also ascertained.

Fraction III.	Fraction V.
S = 2·9684	S = 2·199
L (alc.) = 58·4220	L (alc.) = 46·6506
p. = 4·83 per cent.	p. = 4·5 per cent.
d. = 0·816	d. = 0·816
t. = 20	t. = 20
l = 1 d.m.	l = 1 d.m.
$\alpha$ = + 3·71	$\alpha$ = + 3·81
$(\alpha)_D$ = + 94·1	$(\alpha)_D$ = + 103·75

It will be seen from this table that, with the increase of the boiling point of the fractions up to the sixth, there is on the whole a diminution of the specific gravity, but an increase of the rotatory power. With fraction VII, the increase in temperature is accompanied by an increase of specific gravity, but there is a diminution of the rotatory power.

*Fraction I (170°).*—This fraction was obtained chiefly between 168-170° C. Its high specific gravity led to the suspicion that

pinene might be present. (The specific gravity of pinene being 0.856–0.863 at 20° C. and boiling at 160°.)

First of all, it was desirable to ascertain whether this fraction consisted entirely of hydrocarbons or not.

Upon combustion the following results were obtained :

- (I) 0.1570 g. of substance gave 0.1686 gm. of  $H_2O$  = 0.0187 gm. of H  
and 0.4970 gm. of  $CO_2$  = 0.1315 gm. of C  
(II) 0.1226 g. of substance gave 0.1290 gm. of  $H_2O$  = 0.145 gm. of H  
and 0.3856 gm. of  $CO_2$  = 0.1051 gm. of C

Calculated for		Found.	
$C_{10}H_{16}$	$C_{10}H_{18}$	I.	II.
C, . . 88.23 p.c.	86.95 p.c.	C, . . 85.98 p.c.	85.72 p.c.
H, . . 11.76 p.c.	13.04 p.c.	H, . . 11.91 p.c.	11.82 p.c.

It is evident from these results, that this fraction does not consist exclusively of hydrocarbons. To ascertain whether any esters were present, a small quantity (2.2472 gm. of the fraction) was heated with a standard alcoholic potash solution (5 per cent.) for one hour on a water-bath. But upon titration it was found that none of the potash had been consumed. Thus there is evidently a small quantity of some substance present which escapes identification thus far.

A nitroso chloride was prepared from 10 cc. of this fraction, according to Wallach's method, with a yield of 6.970 gm. The larger portion of this was soluble in ether. The crystals from the ethereal solution were recognized as  $\alpha$ -nitroso chloride, with some dipentene nitroso chloride, which crystallized from the mother liquid of the  $\alpha$ -limonene nitroso chloride. The portion insoluble in ether proved to be limonene  $\beta$ -nitroso chloride as was shown by its solution in chloroform and precipitation as acicular crystals, on the addition of methyl alcohol. The tabular crystals of the  $\alpha$ -nitroso chloride, when dried melted at from 94–95.5° C. Those of the limonene  $\beta$ -nitroso chloride when dried melted at 104° C.

In rotatory power the  $\alpha$ -nitroso chloride compared favorably with the results of Wallach and Conradi,<sup>1</sup> as shown by the following data :

$$\begin{aligned}
 S &= 2.00 \\
 L \text{ (ether)} &= 38.0 \\
 p. &= 5 \text{ per cent.} \\
 d. &= 0.750 \\
 t. &= 20^\circ \\
 I &= + 11.60 \\
 \hline
 (a)_D &= + 309.3
 \end{aligned}$$

<sup>1</sup> Annalen, p. 252.

The limonene  $\alpha$ -nitroso chloride was converted into a benzylamine base, which when dried melts from  $92-93^{\circ}$  C. (Melting point for limonene  $\alpha$ -nitrolamine as observed by Wallach<sup>1</sup> is the same, i.e.,  $92-93^{\circ}$  C.)

*Fraction II* ( $170-172^{\circ}$ ).—Of this fraction a nitroso chloride was also prepared and purified as described above. The melting point of the tabular crystals, from the ethereal solution, when dried, was from  $99-102^{\circ}$  C. A benzylamine base was made of the limonene nitroso chloride, which when dried, melted from  $91-92.5^{\circ}$  C.

*Fraction III* ( $172-174^{\circ}$ ).—The limonene  $\alpha$ -nitroso chloride prepared from this, when purified and dried, melted at from  $99-103^{\circ}$  C. The benzylamine base of this when dried, melted at from  $91-92.5^{\circ}$  C.

*Fraction IV* ( $174-175^{\circ}$ ).—Although there can be but little doubt as to the largest per cent. of this fraction being limonene, traces of foreign bodies have covered the odor of this hydrocarbon. In order to bring out the limonene odor, these foreign bodies were removed by treating a portion of the fraction with permanganate of potash solution. To 200 cc. of a half per cent. of permanganate of potash solution, 10 cc. of oil were added. This after standing for twelve hours discolored the solution. The oil was separated and added to fresh solution of permanganate of potash. This, upon standing in the cold for twenty-four hours, did not change color. The original odor, however, of the oil had been changed to that of pure limonene.

*Fraction V* ( $175-176^{\circ}$ ).—Of this fraction a nitroso chloride was also prepared, which when pure melted from  $99-103^{\circ}$  C. The benzylamine base, into which the limonene nitroso chloride converted, when dried, melted at  $90-92^{\circ}$  C.

These results verify the statement that Erigeron oil consists chiefly of dextrogyrated limonene. Even these fractions, which possessed a somewhat higher or lower boiling point—evidently consist almost entirely of this hydrocarbon, the boiling point of which is slightly depressed or raised by other substances. The thought that pinene possibly occurred together with limonene in the oil evidently must be dismissed. The principal constituent of the oil besides limonene appears to be a high boiling substance, probably aldehyde-like in

<sup>1</sup> Annalen, p. 136.

character, since it so readily decomposed, and polymerizes. In order to isolate this substance, other methods than fractional distillation under ordinary pressure must be resorted to.

PHARM. LABORATORY, UNIV. OF WISCONSIN, MADISON.

## JUGLANS CINEREA, L.

BY ELLIOT D. TRUMAN, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 127.

This tree is indigenous to northeastern United States and Canada. It perhaps grows nowhere more luxuriantly than in central New York State. Its abundance in that section has occasioned the naming of a sub-tributary, of the Susquehanna, the "Butternut Creek."

The wood of this tree is used to some extent in the manufacture of furniture, it being easily worked, very durable, and susceptible of a fine polish.

The fruit is employed as an article of food, both in the unripe state, when it is pickled, and as the ripened fruit in the well-known butternut.

The bark furnishes us a remedial agent of undoubted value, which is, or has been, largely employed in stomach and bowel derangements, in this country perhaps more largely during the 18th and first part of the 19th century than at the present time.

This bark was examined in 1872, by C. O. Thiebaud, who found it to contain bitter extractive oily matter in large proportion, and a volatile acid, juglandic acid, crystallizing in colorless tabular crystals. The ash was found to consist largely of potassium, with traces of sodium, calcium and aluminum.

Again in 1874, the bark was investigated by E. S. Dawson. He found it to contain resin, in small proportion, a volatile acid, and the ash to consist of magnesium in addition to the bases above-mentioned. These bases were found in combination with carbonic, hydrochloric, phosphoric and silicic acids.

The present examination of this bark, having been carried out in a somewhat different manner from those of Thiebaud and Dawson, the results are given for convenience in a tabulated form. There were two analyses made, the treatment of the drug being identical in each case.



In the first analysis, a quantity of the root bark, crop of 1892, was obtained from a reliable commercial source, and the work carried out in November and December of that year. In the second analysis, the bark from the branches of the tree was employed. This bark was collected for the author early in January of this year, in Otsego County, New York State. A tree about twenty years old was selected, and the bark taken from branches 4 to 5 inches in diameter, without removing the corky portion

Solvent Used.	Root Bark.	Per Cent.	Trunk Bark.	Per Cent.
Petroleum ether, . . .	Fixed oil, . . . . .	4'94	Fixed oil, . . . . .	5'98
Stronger ether, . . .	Fixed oil and colorless crystalline resin, . . . . .	2'31	Fixed oil and colorless crystalline resin, . . . . .	2'59
Absolute alcohol, . .	Juglandic acid, extractive matter, etc.,	6'94	Uncrystallizable acid, crystalline resin, etc., . . . . .	7'42
Distilled water, .	Dextrin, . . . . .	0'52	Dextrin, . . . . .	0'70
	Mucilage, . . . . .	2'25	Mucilage, . . . . .	0'70
	Glucose, . . . . .	3'05	Glucose, . . . . .	3'34
	Saccharose, . . . . .	1'34	Saccharose, . . . . .	2'06
Dilute solution of sodium hydrate,	Extractive, . . . . .	2'49	Extractive, . . . . .	4'20
	Pectin and albuminous matter, . . .	1'68	Pectin and albuminous matter, . . .	1'48
	Coloring matter and extractive, . . .	6'86	Coloring matter and extractive, . . .	2'06
	Pararabin and traces of calcium oxalate, . . .	2'62	Pararabin and calcium oxalate, . . .	4'08
Dilute hydrochloric acid, . . . . .	Lignin, . . . . .	9'22		6'96
	Cellulose, . . . . .	44'26		43'79
	Moisture, . . . . .	4'60		4'75
	Ash, . . . . .	5'82		5'34
Chlorine water, .	Loss, . . . . .	1'10		4'55
		100'00		100'00

The fixed oil in each case was brown in color, and saponifiable by alkalies, the latter turned them of a violet color, this color was much brighter with the oil from the bark of the root.

Of the extractions with ether, when that from the bark of the root was treated with water the latter was colored a bright straw-yellow, it was neutral to litmus and gave a bluish-brown color with solution of ferric chloride. This water solution was tested for glucose and glucosides, but no reactions observed. The remainder of the ethereal extract consisted in part of a brown fixed oil, identical in appearance and reactions with that extracted by petroleum ether,

and in part of a nearly colorless crystalline resin. This resin gave no characteristic color reactions with the mineral acids. The ethereal extract from the bark of the tree did not impart a straw color to water, and gave no reactions with glucosidal reagents. The residue in this case, as in the other, consisted of oil and crystalline resin.

The alcoholic extracts of the drugs yielded a red-wine color to water, which color was in part removed by agitation with ether, and on evaporation of the latter solvent there were deposited orange crystals, which became of a deep violet with alkalis. They represented the juglandic acid of former investigators, and were so readily decomposed that mere solution in ether caused their decomposition with the formation of resinous products, insoluble in water. The portion of the alcoholic extract insoluble in water consisted of this insoluble residue. A qualitative analysis of the ash confirmed, in most part, Dawson's report, the aluminum was not found, and no doubt the former investigators were misled by the calcium phosphate.

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### BENZYLIDINE DIPIPERIDINE.<sup>1</sup>

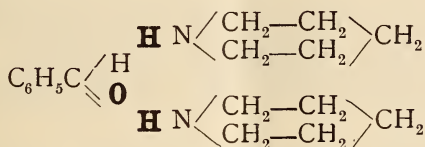
BY GEORGE W. ASCOTT.

During the year of 1891-92, Chas. F. Tompkins made a study of benzylidene dipiperidine and several of its derivatives. He showed that this compound could be readily obtained by the condensation of one molecule of benzaldehyde and two molecules of piperidine. The readiness with which this reaction takes place is quite remarkable and would appear to be rather incompatible with the decomposition of this compound into its components. Of the derivatives of benzylidene dipiperidine studied, two are of special interest. One of these was prepared by Mr. Tompkins, by passing hydrogen sulphide into benzylidene dipiperidine in alcoholic solution, when it separates as a grayish white amorphous powder, which can be converted into a crystalline compound with comparative ease. The other one, a crystalline compound, was obtained from the mother liquor of the first. Both of these compounds invite further investigation.

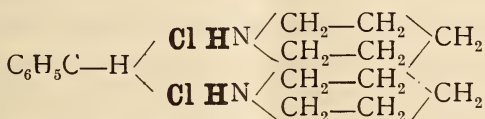
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<sup>1</sup> Read before the meeting of the Wis. Pharm. Assoc., Fond du Lac, August, 1893.

*Benzylidene Dipiperidine.*—No difficulty was experienced in preparing this compound according to the method given last year in the "Proceedings of the Wisconsin Pharmaceutical Association" of 1892, p. 84. Since the synthesis of this compound was so readily effected with benzaldehyde according to the following reaction :



It seemed desirable to effect the same with benzalchloride in the following manner :



5.3 grams of piperidine are added to a solution of 5 grams of benzalchloride in 10 grams of petroleum-ether. The solution is heated on a water-bath in a flask connected with an inverted condenser for 15 minutes. The solution is then filtered and set aside in a crystallizing dish. The yield of the crystallized product is very small, and is evidently the hydrochlorate of benzylidene dipiperidine as is shown by its analysis.

0.1700 grams yielded 0.1523 grams AgCl = 0.03753 grams Cl.

Calculated for  
 $\text{C}_{17}\text{H}_{26}\text{N}_2 \cdot 2\text{HCl}$   
 21.40 p. c.

Found.  
 22.07

Benzylidene dipiperidine hydrochlorate crystallizes in long shining needles, having a melting point of  $250^\circ \text{C}$ . It is soluble in alcohol, chloroform and ether, from which it may be recrystallized. Owing to the readiness with which benzylidene dipiperidine decomposes under the action of alkalis, no attempt was made to prepare the free base from this salt.

*Platinum Double Salt.*—On p. 85, "Proceedings of the Wisconsin Pharmaceutical Association," of 1892, it will be seen that the platinum calculated for in the formula  $\text{C}_6\text{H}_5\text{CH} \cdot (\text{NC}_5\text{H}_{10}\text{HCl})_2 \cdot 2\text{PtCl}_4$  is given as 67.20 per cent., while that obtained was 67.55 per cent. This evidently is a mistake, as a compound of the above formula

should contain but 38.72 per cent. An estimation of the platinum in the salt prepared by Mr. Tompkins gave the following results :

0.0954 grams yielded 0.0362 grams of platinum.

Calculated for  
 $C_{17}H_{28}N_2Cl_{10}Pt_2$   
38.72 p. c.

Found.  
37.94 p. c.

*Gold Double Salt.*—A double salt of gold chloride and the hydrochlorate of benzylidine dipiperidine was prepared in a similar manner to the platinum double salt. When analyzed it yielded the following results :

0.1520 grams yielded 0.0592 grams of gold.

Calculated for  
 $C_{17}H_{28}Cl_2N_2AuCl_3$   
40.40 p. c.

Found.  
38.94 p. c.

This salt forms bright yellow prisms, which are freely soluble in alcohol, chloroform and ether, and have a melting point of 183–185°.

*Benzylidine Dipiperidine and Picric Acid.*—If to an alcoholic solution of benzylidine dipiperidine an alcoholic solution of picric acid be added in molecular proportions, and the combined solutions filtered and set aside to crystallize, handsome yellow crystals will separate out. This compound when recrystallized from alcohol and analyzed yielded the following results :

I. 0.1543 grams yielded 12 cc. of nitrogen under a barometric pressure of 739 mm., and at a temperature of 23° C. = 0.011234976 N.

II. 0.2010 grams yielded under a barometric pressure of 720.4 mm. and at a temperature of 22° C. 14 cc. of N = 0.01505588 N.

Calculated for  
 $C_{17}H_{26}N_2C_6H_2(NO_2)_3OH$   
14.30 p. c.

$C_{23}H_{27}N_3O_3$   
11.13

Found.	
I.	II.
7.28	7.01

This compound has a melting point of 146° C. It is soluble in alcohol, chloroform and ether, from which it may be recrystallized. When heated in the flame of a Bunsen burner it decomposes with a slight explosion, leaving a black residue. A satisfactory formula has not yet been calculated.

*Amorphous Sulphur Compound.*—This compound was very readily prepared according to the method given on p. 85 of the "Proceedings of the Wisconsin Pharmaceutical Association for 1892." Hydrogen sulphide is passed into a cold alcoholic solution of benzylidine dipiperidine when the amorphous compound will separate out, and the liquid assumes a deep red color, having a strong odor of hydrogen



sulphide. The average yield of the compound was 35-38 per cent., while in the experiments conducted by Mr. Tompkins, about 40 per cent. was obtained. This amorphous compound is insoluble in alcohol, but is readily soluble in ether, chloroform and disulphide of carbon.

It melts at a temperature of 150-155° C. and when heated in small quantities in test tubes, at a very gentle heat, fuses to a dark amber colored liquid, which upon cooling solidifies without crystallization. If, however, it be heated to a higher temperature, upon cooling it deposits crystals, part of which are soluble in alcohol and the remainder in ether. After removing the crystals soluble in alcohol and allowing to recrystallize, the substance will at first separate out as an amorphous powder, which, however, after being repeatedly crystallized from chloroform and alcohol may be obtained as handsome needle-shaped crystals or as very fine crystalline scales of a brownish yellow color. That portion of the crystallized product insoluble in alcohol, but soluble in ether, was then removed from the amorphous residue, and after being repeatedly crystallized was obtained in a fairly pure condition, when they were found to be readily soluble in alcohol, from which they recrystallize in handsome needles. These crystals have the same melting point and the same properties as the alcoholic crystals. They melt at 120° C. and when analyzed yielded the following results:

I.	0.200 grams yielded . . . . .	0.6557g	CO <sub>2</sub> = 0.1788	grams	C
	" " " . . . . .	0.1220g	H <sub>2</sub> O = 0.01355	"	H
II.	0.1664 grams yielded . . . . .	0.5232g	CO <sub>2</sub> = 0.1426	"	C
	" " " . . . . .	0.1006g	H <sub>2</sub> O = 0.01112	"	H
III.	0.1280 grams yielded . . . . .	0.4179g	CO <sub>2</sub> = 0.11397	"	C
	" " " . . . . .	0.0836g	H <sub>2</sub> O = 0.00928	"	H

IV. 0.1379 grams yielded under a barometric pressure of 721 mm. and at a temperature of 21° C. 9.8 cc. of nitrogen = 0.01062768 grams N.

Calculated for C <sub>17</sub> H <sub>30</sub> N <sub>2</sub>		Found.			
	Per Cent.	I.	II.	III.	IV.
C, . . . . .	77.8	89.04	85.69	89.03	—
H, . . . . .	11.4	6.70	6.68	7.25	—
N, . . . . .	10.6	—	—	—	7.63

It is remarkable that this compound is totally free from sulphur, which remains behind with the amorphous residue. Upon long standing this amorphous compound undergoes the same decomposition as when heated.

*Crystalline Sulphur Compound.*—After removal of the amorphous sulphur compound from the alcoholic solution of benzylidene dipiperidine the mother liquor was set aside in a cool place.

After standing for several weeks crystals began to form, at first very slowly, but later on quite rapidly, continuing until the entire liquid had evaporated. This would seem to indicate that by the action of hydrogen sulphide on benzylidene dipiperidine, in alcoholic solution, two compounds at least are formed.

The sulphur in this crystalline compound estimated as barium sulphate gave the following results:

I.	0.1556	grams	yielded	0.3144	grams	BaSO <sub>4</sub>	=	0.0431	S
II.	0.1948	"	"	0.40894	"	BaSO <sub>4</sub>	=	0.05616	S

	Calculated for C <sub>17</sub> H <sub>30</sub> N <sub>2</sub> S <sub>3</sub>	Found.	
		I.	II.
	26.81 p. c.	27.12	28.02

The result of this sulphur estimation agrees fairly well with the results obtained by Mr. Tompkins.

This compound, when thoroughly purified by recrystallization, yields crystals of a grayish white color having a melting point of 75–76° C. They are soluble in alcohol, from which they recrystallize readily. This compound is permanent in the air and when boiled with water separates oily drops which float. It fuses at a gentle heat and upon cooling crystallizes without apparent change.

*Benzylidene Aniline.*—Since, by the action of hydrogen sulphide on benzylidene dipiperidine, two very interesting compounds were obtained, it was thought well to ascertain if similar results could be obtained with other condensation products of benzaldehyde. To this end benzylidene aniline was prepared in the following manner: 4.3 grams of aniline was added to a solution of 5 grams of benzaldehyde in 10 grams of petroleum-ether. The mixture is heated on a water-bath in a flask connected with an inverted condenser for fifteen minutes. The solution is then filtered and set aside to crystallize. It crystallizes very readily, a large yield being obtained. From fifteen grams of benzaldehyde 10.34 grams of benzylidene aniline were obtained or 68.92 per cent. This was dissolved in alcohol and a current of hydrogen sulphide led into the solution when a grayish amorphous compound separated out similar to that obtained from benzylidene dipiperidine. From 10.34 grams of benzylidene aniline, 7.08 grams of the amorphous compound were obtained or 68.4 per cent. This

compound when heated in small quantities in test tubes fuses to a greenish liquid, which rapidly turns to a dark amber. Upon cooling it deposits crystals. These crystals are partly soluble in alcohol and the remainder in ether. An amorphous residue remains, which contains sulphur. The crystals, when purified, are all found to be soluble in alcohol, from which they crystallize in very fine crystalline scales. They have a melting point of  $120^{\circ}$  C., and to all outward appearances are identical with those obtained from benzyldine dipiperidine.

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## AN IMPROVED SHAPE FOR SUPPOSITORIES AND BOUGIES.

BY HENRY S. WELLCOME.

[Read before the American Pharmaceutical Association, Chicago, 1893.]

The use of suppositories as vehicles for medication and alimentation has undoubtedly greatly increased during the past few years, but it is a very remarkable fact that since their first introduction into pharmacy there has been scarcely any improvement in shape.

The ordinary cone-shaped suppository which has so long done duty is easily inserted, but often more easily expelled, and this great defect has caused the most aggravating annoyance and disappointment to both physician and patient.

When a suppository of the ordinary shape is introduced into the anus or fundament, the lower extremity of the great intestine, the pressure of the muscles which are peculiar to the *sphincter ani* act entirely with expelling force, unless the suppository is introduced a considerable distance into the rectum. Even then, the *levator ani*, which serve to dilate and draw the anus up to its natural situation after the expulsion of the *fæces*, fail to grasp the suppository when introduced small end first on account of its unreasonable shape; in fact, the old suppository has always been introduced wrong end first.

A double cone-shaped suppository has been devised, which is certainly an improvement over the ancient form, but this does not in all cases insure retention, as the double cone form only secures

about equal division of the retaining and expelling force of the *sphincter ani*.

I have designed a suppository which I believe fully overcomes the difficulty. It is practically the reverse of the old shape. This improved suppository is formed with a thick bulb abruptly pointed at the apex like a fat cigar or minnie bullet, and gradually tapered at the base.

A forty-five grain cacao butter rectal suppository of this shape is one and a half inches in length and half an inch in diameter at the thickest portion of the bulb, the thickest portion being half an

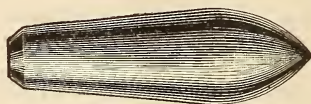


FIG. 1.—Rectal Suppository.

inch from the apex and one inch from base. The base is a quarter of an inch in diameter and is cut off transversely. The taper both to the apex and to the base has a somewhat bulbous curve, as shown in the accompanying drawing.

This improved suppository is inserted with the thick bulbous head foremost, and by the reflex contraction of the *sphincter ani* not only is expulsion prevented, but the suppository is naturally held in position. The entire muscular force acts to retain and press inward.

These suppositories of my design have been tested in one of the principal London hospitals with unqualified success. I apply this



FIG. 2.—Urethral Bougie.

same shape suitably modified for vaginal suppositories, also with suitable modifications for urethral bougies.

Any pharmacist who desires to please the medical profession, and greatly benefit those for whom he dispenses—to say nothing of his own profit from enterprise—may by a small outlay procure moulds for preparing suppositories of this shape from any mould maker—they are neither registered nor patented.



## THE PREPARATION OF THE OAK TANNINS, WITH SPECIAL REFERENCE TO THE USE OF ACETONE AS A SOLVENT.<sup>1</sup>

BY HENRY TRIMBLE AND JOSIAH C. PEACOCK.

The usual method for preparing a tannin from a substance as rich as nutgalls, or containing from 60 to 70 per cent. of the astringent principle, is to extract with a mixture of alcohol and ether, or, what amounts to the same thing, official ether, sp. gr. 0.750. When, however, the material is an oak bark, containing from 4 to 15 per cent. of tannin, the choice of a proper solvent becomes a more difficult matter.

During the past year a number of experiments have been made on oak bark with a view of determining the most satisfactory solvent for the tannin. The following are especially worthy of consideration:

(1) Official ether sp. gr. 0.750, which is equivalent to a mixture of alcohol and ether.

(2) Acetic ether.

(3) Water.

(4) Acetone.

The greatest objections to ether are its expense and the slowness of its solvent action, which consume time as well as a large amount of menstruum.

Acetic ether is a much better solvent, and the expense is the chief difficulty in the way of its use.

Water is slow in its solvent action; this, however, is in part overcome by long maceration, and then slow percolation. The tannin must be separated from the resulting aqueous solution, either by agitation with acetic ether, or by precipitation with lead acetate. In the latter process it was found possible at a considerable sacrifice of oak bark to procure a quantity of light-colored tannin, by precipitating one-half of the aqueous percolate with lead acetate, collecting the precipitate, stirring it through the other half of the percolate, and then filtering. The filtrate was very light in color, and was either evaporated under reduced pressure and submitted to further purification to be described hereafter, or it was agitated with

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<sup>1</sup> Read at the meeting of the American Pharmaceutical Association, Aug. 16.

acetic ether, and, after removal of the latter solvent, purified in the same manner.

Apart from the slowness of this process, the yield of tannin after purification was always small when water was used as a solvent.

Within the past few years acetone has appeared in commerce in a nearly pure form. Its solvent action has been suggested for several plant principles, but thus far little, if any, reference has been made to its use as a solvent for tannin, although there is good reason for believing that some manufacturers are using it for the extraction of nutgalls. It is cheaper than ether, but more expensive than alcohol. It is a better solvent of tannin than either of these, and extracts the tannin with less sugar and other carbohydrates, because of its poor solvent power over these. Its low boiling point,  $56.5^{\circ}$ , renders its recovery easy and rapid, without danger of decomposition to the tannin.

From a sample of powdered nutgalls, commercial ether extracted 59.77 per cent. of solids, while acetone extracted 62.24 per cent. of the same.

The following process, after some preliminary experiments, has been devised and thus far proven satisfactory.

The powdered oak bark was well moistened with acetone, packed in a glass percolator, and the menstruum poured on until it commenced to drop from the lower orifice, when the latter was closed with a cork and the bark allowed to macerate for forty-eight hours. Enough of the solvent was poured on before maceration commenced to keep a thin layer of it above the drug. A glass plate smeared with petrolatum was kept on top the percolator to prevent evaporation. At the expiration of the maceration period, the stopper was removed and the percolation continued rapidly until the number of litres of percolate amounted to one-half the number of kilograms of oak bark used. The latter was then usually found to have been exhausted. In some instances, a No. 20, in others a No. 40 powder was used. In every case the acetone rapidly penetrated the drug and accomplished complete exhaustion. The acetone was removed by distillation, the first portion on a water-bath, under ordinary conditions, but the last portions by the additional aid of reduced pressure. The residual product was a dark red or brown semi-solid extract. This was warmed with water until nearly all of it dissolved. After cooling, the whole was fil-

tered and the clear filtrate was diluted with water as long as precipitation took place. This dilution separated much of the anhydrides. The filtrate from these was of a clear red color and yielded no further precipitate on the addition of water. It was agitated successively with acetic ether. The acetic ether portions were mixed and the solvent recovered by distillation under reduced pressure, which yielded the tannin in a porous or "puffed up" condition. The product was then treated with cold water, and, after filtration, was again separated by agitation with acetic ether. This process was continually repeated until the tannin was readily and completely soluble in water. The tannin then possessed considerable odor of acetic ether, which was removed by solution in official ether, sp. gr. 0.750, and, after filtering clear, distilling off the solvent under reduced pressure. The product was then digested with absolute ether, which dissolved the small amounts of adhering resin and crystalline principles which occur along with it in the bark or result from decomposition when working it, and the tannin remained behind nearly pure, and readily and completely soluble in water.

This process was carried out on barks from the following species of oaks: *Quercus alba*, *Q. coccinea* and its variety *tinctoria*, *Q. falcata*, *Q. palustris*, *Q. Prinus*, *Q. bicolor*, *Q. stellata*, *Q. Phellos* and *Q. rubra*. It was found in some cases that by dissolving the acetone residue in a mixture of four parts water and one part alcohol, instead of water alone, that there was less formation of anhydrides.

A few trials were made with a modification of the purification process in which the first acetic ether residue was dissolved in water and filtered through a freshly prepared lead compound obtained by precipitating a portion of the aqueous solution of the bark with lead acetate.

In some instances, the resulting filtrate was nearly colorless, but the loss of tannin was such as not to warrant the adoption of the process for general use. It might, however, be applied in certain cases with satisfactory results. From the colorless filtrate the tannin should be removed by agitation with acetic ether, and the remainder of the general purification process then carried out.

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**Betaine and Choline** were obtained by E. Jahns from Levant worm-seed. (Ber. d. D. Chem. Gesell., 1893, 1493.)

IS IT POSSIBLE TO PRODUCE FLUID EXTRACTS OF  
SUCH STRENGTH THAT THEY CAN BE DILU-  
TED WITH PROPER MENSTRUUA TO  
STANDARD TINCTURES?<sup>1</sup>

BY JOSEPH W. ENGLAND, PH.G.

Chief Druggist of the Philadelphia Hospital.

Examination of this query shows that its affirmative answer hinges upon the possibility of making fluid extracts which, properly diluted, yield products *identical* in the proportion and kinds of proximate principles found in tinctures made by direct exhaustion of the drug.

Can such fluid extracts be made?

If they can be, there is no need of making drug-tinctures, or tinctures from drugs; all that is necessary is a line of fluid extracts, and proper dilution, as wanted. If they cannot be made, then the practice should be condemned. The issue is a plain one; and the necessity of an accurate determination of the question demands the serious consideration of every thoughtful pharmacist.

If such fluid extracts can be made, it is obvious that certain conditions must exist. These are:

(1) That the physical conditions under which the drug is exhausted, shall be the same in making the fluid extract as in making the drug-tincture.

(2) That the menstruum employed in making the fluid extract and the drug-tincture shall be identical.

(3) That in the making of the fluid extract the drug shall be exhausted of *all* the proximate principles present in the drug-tincture, and in as great a *relative* proportion.

(4) That the fluid extract shall not be altered in composition by heat, from concentration of percolate.

(5) That the fluid extract shall not precipitate proximate principles on storing, and have these removed before being used.

It is not a difficult matter to have the physical conditions of drug-exhaustion the same in making a fluid extract as in making a drug-tincture. If, however, there is a change or difference of menstruum, it is manifest there must be a change or difference in the proximate principles dissolved; but this will be referred to later.

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<sup>1</sup> Read at the meeting of the Georgia Pharm. Assoc.



If fluid extracts are to serve the double purpose of being used for making tinctures and also for their own virtues, it is essential that they contain *all* the soluble, proximate principles found in drug-tinctures, and in as great relative proportions.

Wherever medicinal action obtains, the therapeutically-active principles of a vegetable drug are *soluble* principles, that is soluble in water or alcohol, or a mixture of the two. *All* the soluble proximate principles of a vegetable drug are not necessarily therapeutically active, but in the immature condition of the rational therapeutics of our times, as to the changes produced by drug-extractives in cellular contents in diseased conditions, who can say that a given extractive of a drug having medicinal activity is inert or without medicinal value? At present, clinical evidence decides, most largely, the therapeutical worth of a drug or its preparation.

The action of a drug or its representative is exerted upon the cellular contents of human tissue or tissues in which the drug acts, modifying one or all of three cellular activities, *i. e.*, (1) nutritive, (2) functional, and (3) reproductive. The functional activities of cells being the most obvious, they have been the most carefully noted by therapeutists, indeed the modern description of the therapeutical action of a drug is almost wholly limited to a description of the functional disturbances produced by it. When it comes to a description of the modifying influence of drugs or their representatives upon the nutritive and reproductive activities of cells in disease, modern therapy has little to say in comparison with the attention paid to functional changes. In therapeutical experiments, unless a change be obvious, it is too often assumed that there is no change, and yet the nutrition and reproduction of the cell may be notably affected and not be obvious. Further, the activities of nutrition and reproduction are vitally connected with the existence of the cell, and most probably influence its functions; nutrition, certainly, plays a most important part in affecting function.

In addition to the necessity of fluid extracts containing *all* the proximate principles of drugs found in drug-tinctures (*if* they are to be used for making tinctures), it follows, of course, that they should be present in as great a *relative* proportion, so that the extract-tincture and the drug-tincture be equally representative of the drug in the amount of proximate principles present.

No isolated proximate principles, such as alkaloids, glucosides,

etc., can represent the *total* therapeutical activities of a drug. They represent their individual, therapeutical actions *only*, and nothing more. The *total* activities of a drug can only be had from the drug itself, or a preparation of the drug representing *all* the therapeutically active proximate principles as they exist in the drug. Hence, for example, aconitine, hyoscyamine, digitalin, and quinine represent their individual activities only. They do not represent the *total* therapeutical activities of aconite root, hyoscyamus leaves, digitalis leaves, and cinchona bark, respectively, for these drugs possess *other* proximate principles which have a therapeutic worth over and above that of the principles mentioned. It does not follow, either, that tinctures and fluid extracts necessarily represent the *total* therapeutical activities of drugs. They represent only the therapeutically active principles soluble in the menstrua used to exhaust the drugs, due allowances being made, of course, for those precipitated and removed.

Whilst alkaloids, glucosides, etc., do not represent the total activities of drugs, their isolation, where decomposition-products are not formed as a result of assay, is, next to clinical experience, the only means we have of estimating the therapeutic worth of a drug-preparation; and it is of value when—and *only* when, the manufacturer of the preparation uses in its making, the *proper* quality of crude drug. If he uses an inferior drug, and raises the natural amount of alkaloid or glucoside to the proper standard by their extraneous addition, the preparation will *not* represent the special activities of the superior drug, but will represent those of the inferior drug plus those of the compound added.

This doctrine of the individuality of the drug as against the individuality of its so-called active principles, is no new doctrine. It has been repeatedly taught by Squibb and other authorities, but in their strong endeavors to secure greater uniformity in drug-preparations (a laudable ambition within certain limits), manufacturers have largely ignored its existence; claiming that the percentage of a so called active principle is, of necessity, an index of the total therapeutic value of the drug-preparation.

Appropos of this subject, Prof. Attfield gives, in a recent number of *The Pharmaceutical Journal and Transactions* (July 15, 1893) some very interesting data had from an examination of certain samples of ipecacuanha. After showing the results of his analysis, and stating

that while such an alkaloid, as say quinine or morphine, has, at least, fixed and definite properties, the so-called "emetine" has not yet been obtained in sufficiently fixed and definite condition to enable us to say that it is one single substance, emetine, and nothing else. He further states that the acids and alkalis used by analysts in the isolation of the emetine attack it and render its yield inconstant, and says:

"It is to be hoped that any future authoritatively enjoined 'standardization' of ipecacuanha founded on proportion of emetine will be *therapeutically*<sup>1</sup> satisfactory, but such a position is not yet attained. Indeed, *it would seem that ipecacuanha root from which all 'emetine' is removed still has pharmacological value.*<sup>1</sup> The latter may or may not run parallel with percentage of emetine; meanwhile, our only guide is 'emetine,' estimated with all attainable accuracy."

So, it is a serious question whether tinctures made by diluting fluid extracts, *even though the latter be assayed*, are as good from a therapeutic standpoint as those made from the crude drug. Under certain conditions, it would seem as though some might be, but are they? As before said, alkaloids, glucosides, etc., do not represent the *total* therapeutical activities of drugs, and even if the relative strength of so-called active principle be the same in the "extract-tincture" as in the "drug-tincture," it indicates but one thing—the strength of the preparation in alkaloid or glucoside. It cannot indicate the amount of the other proximate principles of the drug. As in the case cited above, these latter may or may not run parallel with the alkaloid or glucoside.

The extractive matter of a drug (apart from the so-called active principles) has in many cases positive therapeutical worth, otherwise alcoholic or dilute alcoholic solutions of so-called active principles should yield *all* the therapeutical results of drug-tinctures; and we know they do not. That tincture only, then, is official, which contains *all* the therapeutically active constituents of the drug—alkaloids, glucosides and other extractive matter included—soluble in the menstruum officially directed for the tincture.

In those cases where it is possible, in the making of a fluid extract, to exhaust a drug of all its soluble proximate principles without the

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<sup>1</sup> Italicized by J. W. England.

deleterious use of heat, and without subsequent precipitation of proximate principles with their necessary removal by filtration, it would seem as though a tincture made by diluting such a fluid extract should exhibit the same proximate constituents of the drug, in the same proportions, as the tincture made from the same sample of crude drug. But, it is evident that this can be the case, under such conditions only, *when the menstruum used in the making of the fluid extract is the same as that used in the making of the drug-tincture*. A change in alcoholic strength of menstruum used, always results in a change of the proportions, and in the same cases, of the kinds of proximate principles dissolved.

As an example of the influence changes in menstrua exert, a practice of the last Pharmacopœia may be cited. In the making of fluid extracts, the 1870 issue directed that the last portions of the percolate should be evaporated to a certain volume, and mixed with the reserved portion. This resulted in precipitation of proximate principles, owing to the fact that through evaporation of the last portions of the percolate the more volatile alcohol was most largely removed, leaving a weakly alcoholic liquid to mix with a stronger alcoholic one: hence precipitation occurred. In 1880, this practice was changed, and the last portions of the percolate are now evaporated to extractive, thereby eliminating both alcohol and water, and this is dissolved in the reserved percolate.

As a rule the more strongly alcoholic a menstruum used, the more rapid the exhaustion and the less extractive matter dissolved, while the more aqueous a menstruum, the slower the exhaustion and the greater the amount of extractive brought into solution. Hence, it is clear, that a tincture prepared from a fluid extract made with a certain menstruum, must, of necessity, be a different preparation in the proportion and, in some cases, of its kind of proximate principles, from a tincture of a crude drug made with a different menstruum.

It is a significant fact, that a number of important official tinctures are directed to be made with menstrua different in alcoholic strength from those ordered for corresponding fluid extracts; and this difference makes it impossible, in such cases, to obtain, by diluting the fluid extracts, the *same* therapeutical representatives of the drug as exhibited in the drug-tinctures.

The following table of certain official tinctures, showing the



strengths of menstrua for the tinctures and corresponding fluid extracts is of interest :

Name of Drug.	Menstruum for Tincture.	Menstruum for Fluid Extract.
	(parts.)	(parts.)
Digitalis, . . . . .	A 1, W 1.	A 3, W 1.
Belladonna, . . . . .	A 1, W 1.	A.
Hyoscyamus, . . . . .	A 1, W 1.	A 3, W 1.
Stramonium, . . . . .	A 1, W 1.	A 3, W 1.
Rhubarb, . . . . .	A 1, W 1.	A 3, W 1.
Hydrastis, . . . . .	A 1, W 1.	A 3, W 1.
Serpentaria, . . . . .	A 1, W 1.	A 3, W 1.
Cubeb, . . . . .	A 1, W 1.	A.
Sanguinaria, . . . . .	A 2, W 1.	A.
Squill, . . . . .	A 1, W 1.	A.
Colchicum Seed, . . . . .	A 1, W 1.	A 2, W 1.
Bitter Orange Peel, . . . . .	A 1, W 1.	A 2, W 1.

A, Alcohol; W, Water.

From this table it will be seen that, in the cases mentioned, much more strongly alcoholic menstrua are used for fluid extracts, than are directed for corresponding tinctures; and this must result in a certain relative difference between the two preparations.

A good illustration of the changes attendant upon a difference of menstrua, may be found in digitalis infusion. It is now accepted that the most important proximate constituents of digitalis leaves are Schmiedeberg's digitalin, with digitoxin, digitonin and digitalein. These may be grouped into two classes according to solubility. First, those soluble in alcohol and insoluble or almost insoluble in water; second, those soluble in both alcohol and water. Digitoxin and digitalin belong to the first group, and digitonin and digitalein belong to the second group. It will be seen that the tincture and fluid extract contain, most largely, digitoxin and digitalin with some digitonin and digitalein, whilst the infusion

contains digitonin and digitalein with *no* digitoxin or digitalin. So, the making of infusion of digitalis from the tincture or fluid extract (as is sometimes done) should be condemned, as such a practice will not yield the same preparation, therapeutically, as that had by direct infusion of the leaf.

When we come to those drug-tinctures having the same menstrua as corresponding fluid extracts, we should naturally expect, if perfect exhaustion of the same sample of drug has been had in both cases, that the drug-tincture and the extract-tincture would be equally representative of the drug. Theoretically, this may be true, but, practically, it is a question as to whether it holds good as a rule. It may be the case in some few fluid extracts, but in others it certainly is not. Take valerian tincture for example: made by drug-exhaustion it is one thing, made by extract-dilution from a fluid extract of the same sample of drug, it is quite another thing.

But, it may be urged, what evidence is there that drug-tinctures are *therapeutically* superior to extract-tinctures? The best of evidence in such a matter is clinical evidence. As before remarked, it is clinical experience which is accepted nowadays, to prove the therapeutical worth of a drug or its preparation (rational therapeutics has failed, as yet, to be accepted by practitioners unless confirmed by clinical evidence), and clinical experience confirms the view which practical pharmacy teaches—that a tincture made directly from a drug is stronger and better than a diluted fluid extract; no! it teaches more—it teaches that a properly made tincture is *stronger relatively*, than a fluid extract made from the same drug, for the reason *that the maximum doses of fluid extracts are, in many cases, if not in all, relatively greater than those of tinctures!* In other words, it requires more of the drug, relatively, as represented in a fluid extract, to produce its therapeutical effect, than it does of the drug as represented in a drug-tincture.

The following tables of official tinctures are of interest. The doses of fluid extracts are those given by four of the leading manufacturers of this country, for their products. The products stated to be assayed, are so marked. In some cases, the maximum doses of these latter are less than those of the non-assayed products; in other cases they are more.

TABLE NO. 1.

NAME OF DRUG.	Percentage of Drug in U. S. P. Tincture. (by weight.)	Percentage of Drug in U. S. P. Fluid Extract (by volume.)	Increased Strength of Fluid Extract in times.)	Dose of Tincture.	<i>Relative</i> Dose of Fluid Extract.	Dose of Fluid Extract of Manufact'r. A.†	Dose of Fluid Extract of Manufact'r. B.	Dose of Fluid Extract of Manufact'r. C.	Dose of Fluid Extract of Manufact'r. D.	Average of Mann'f's. Maximum Doses.
Aconite Root, . .	40	100	2.5	1-2 Min. (2-6 drops.)	2-4½ Min.	½-2 Min.	½-1 Min.	1-2 Min.	1-3 Min.†	2.0 Min.
Belladonna Leaves,	15	100*	6.6	5-20 Min.	¾-3 "	1-4 "	3-5 "	1-4 "	2-5 "	4.5 "
Cannabis Indica, .	20	100	5.0	5-30 "	1-6 "	2-8 "	2-5 "	2-5 "	1-3 "	5.25 "
Cinchona, . . . .	20	100	5.0	30-120 "	6-24 "	15-60 "	15-60 "	30-75 "	60-120 "	78.75 "
Colchicum Seed, .	15	100	6.6	10-60 "	1½-9 "	2-8 "	5-10 "	2-5 "	2-10 "	8.25 "
Conium, . . . . .	15	100	6.6	15-60 "	2¼-9 "	5-20 "	2-5 "	2-10 "	3-10 "	11.25 "
Digitalis, . . . .	15	100	6.6	5-30 "	¾-4½ "	1-4 "	2-5 "	4-15 "	2-5 "	7.25 "
Gelsemium, . . .	15	100	6.6	5-20 "	¾-3 "	1-6 "	5-10 "	4-15 "	1-3 "	8.5 "
Hyoscyamus, . .	15	100	6.6	10-60 "	1½-9 "	4-10 "	5-10 "	5-10 "	5-10 "	10.0 "
Nux Vomica, . .	20	100	5.0	5-30 "	1-6 "	1-10 "	1-5 "	1-5 "	1-5 "	6.25 "
Stramonium, . .	10	100	10.0	10-30 "	1-3 "	1-4 "	1-3 "	1-3 "	1-3 "	3.25 "
Veratrum Viride, .	50	100	2.0	1-4 (2-8 drops.)	½-2 "	½-2 "	2-4 "	2-5 "	2-4 "	3.75 "

\* Not Official.

† Assayed Fluid Extract.

TABLE NO. 2.

NAME OF DRUG.	Percentage of Drug in U. S. P. Tincture. (by weight.)	Percentage of Drug in U. S. P. Fluid Extract. (by volume.)	Increased Strength of Fluid Extract in Drug. (times.)	Dose of Tincture.	Relative Dose of Fluid Extract.	Dose of Fluid Extract of Manufact'r. A.	Dose of Fluid Extract of Manufact'r. B.	Dose of Fluid Extract of Manufact'r. C.	Dose of Fluid Extract of Manufact'r. D.	Average of Maximum Manuf'rs. Doses.
Capsicum, . . . .	5	100	20'0	10-60 Min.	½-3 Min.	5-15 Min.	5-10 Min.	3-5 Min.	1-5 Min.	10'0 Min.
Cimicifuga, . . .	20	100	5'0	60-120 "	12-24 "	15-60 "	10-30 "	8-30 "	30-60 "	50'0 "
Cubeb, . . . . .	10	100	10'0	30-120 "	3-12 "	10-20 "	15-20 "	30-120 "	10-30 "	47'5 "
Gentian (Comp.),	8	100*	12'5	60-240 "	4½-19½ "	10-40 "	30-60 "	60-120 "	30 60 "	70'0 "
Hops, . . . . .	20	100*	5'0	60-180 "	12-36 "	15-60 "	30-60 "	30-60 "	30-60 "	60'0 "
Hydrastis, . . . .	20	100	5'0	30-60 "	6-12 "	10-30 "	10-30 "	15-60 "	10-30 "	37'5 "
Krameria, . . . .	20	100	5'0	30-120 "	6-24 "	15-30 "	30-60 "	15-60 "	30-60 "	52'5 "
Lobelia, . . . . .	20	100	5'0	10-60 "	2-12 "	10-20 "	10-30 "	5-30 "	5-30 "	27'5 "
Matico, . . . . .	10	100	10'0	30-60 "	3-6 "	15-60 "	30-60 "	30-60 "	30-60 "	60'0 "
Quassia, . . . . .	10	100	10'0	30-60 "	3-6 "	5-15 "	30-60 "	30-60 "	30-60 "	48'75 "
Serpentaria, . . .	10	100	10'0	60-240 "	6-24 "	15-30 "	30-60 "	30-60 "	30-60 "	52'5 "
Sumbul, . . . . .	10	100*	10'0	15-60 "	1½-6 "	10-30 "	15-60 "	15-60 "	15-60 "	52'5 "
Valerian, . . . .	20	100	5'0	30-180 "	6-36 "	30-60 "	15-30 "	30-150 "	15-30 "	67'5 "
Zinziberis, . . . .	20	100	5'0	30-120 "	6-24 "	5-20 "	5-40 "	5-30 "	5-40 "	32'5 "

\* Not Official.



Examination of these tables shows marked differences between the *relative* maximum doses of fluid extracts, and those given by manufacturers for their products; and it should be noted that the manufacturers named fairly agree, in many cases, as to *maximum* doses.

If the contention that representative tinctures of drugs can be properly made by diluting fluid extracts be true, it logically follows that the *relative* dose of a given tincture and fluid extract should be *identical*. If the 10 per cent. tincture of drug *A* has the dose of sixty minims, the 100 per cent. fluid extract of drug *A* should have the dose of six minims, the difference between the official per cent. by weight for tinctures, and per cent. by volume for fluid extract making no material difference. The dose of cinchona tincture being 30 to 120 minims, the dose of the fluid extract (being about five times as strong) should be one-fifth or 6 to 24 minims; yet we find the dose as usually given is from 15 to 60 minims.

If dose is any criterion of drug-strength at all, it follows that the dose of tincture and fluid extract should be *relatively* the same, *if* the latter is to be diluted to make the former; otherwise there must be a certain difference between the proportion and the kinds of proximate principles in the drug-tincture, as compared with those in the extract-tincture. Practically, it seems impossible, save in some few cases, to obtain fluid extracts which will have the same *relative* dose as the drug-tincture, for the *actual* dose of a fluid extract is not of necessity its *relative* dose compared with the dose of the tincture; and if this be so, the making of representative tinctures from fluid extracts is impossible. Manufacturers of fluid extracts are not to be blamed for this; it is a condition of drug-exhaustion over which they have no control. In the making of fluid extracts, manufacturers may exhaust a drug of *all* its soluble proximate principles, obtaining them in solution, but on storing the fluid extract for a time before selling, which is always done (or if it is not done, the fluid extract precipitates afterwards), the product invariably yields, through certain changes, precipitates of proximate principles more or less voluminous in character, and more or less valuable therapeutically. These are removed by decantation and filtration by the manufacturer before the product is sold.

It does not follow that fluid extracts so treated are necessarily inferior, *they may be of excellent quality for fluid extracts*, but they

are not relatively as strong as drug-tinctures. It is clearly unreasonable to claim that the same tincture can be had by extract-dilution as by drug-exhaustion when more or less of the proximate principles of the drug have been removed from the fluid extract used for dilution.

It is a mistaken belief to suppose that a definite relation exists between the tincture and the fluid extract in the amount of drug represented; that, for example, a 100 per cent. fluid extract represents five times as much drug as a corresponding twenty per cent. tincture. A due allowance must be made for the removal, by the maker, of proximate principles precipitated by the fluid extracts; admitting the possibility, of the concentrating in fluid extracts of all the soluble principles of drugs. Hence, under the best conditions, the making of tinctures by diluting fluid extracts cannot yield products equally representative with drug-tinctures, unless perfect exhaustion of drugs be had in making the fluid extracts, and proper allowances be made for the character and amount of proximate principles separated from them; and this latter, from its variability, is out of the question.

It is in evidence, that fluid extracts and tinctures have distinct *therapeutic* fields; that they vary from each other in the relative proportions, and in some cases, of the kinds of proximate principles represented, and that fluid extracts diluted in the usual way cannot, of very necessity, be the same things, *therapeutically*, as tinctures made from superior qualities of drugs.

The practice of using fluid extracts, assayed or not, for making tinctures should be condemned, as inimical to the best interests of legitimate medicine and pharmacy. Only through the use of superior drugs and the making of his own tinctures according to official methods, can the pharmacist *know* the quality of his preparations. How can he vouch for the quality of a drug after it has been made up into a preparation if somebody else has made it?

Admitting that the manufacturer's preparation has been made from the proper quality of drug; after the drug has been exhausted of *all* its soluble proximate constituents; that the official menstruum has been used; that the employment of heat has not affected last portions of percolate, and that various amounts of precipitated proximate principles have not occurred in the fluid extract and been removed, what *knowledge* has the practical pharmacist of these

facts? How can he vouch for the quality of a preparation, or rather the quality of its contained drug, unless he has made that preparation himself?

Further granting that manufacturers, as a class, use the proper quality of drugs in making fluid extracts, is it true that they always follow the directions of the official standard in the procedures and menstrua directed? Or, is it true that the official standard is adopted in part as regards percentage of drug, etc., and procedures and menstrua are used as suits the manufacturer? Manufacturers, generally, lay stress upon the fact that their fluid extracts are "strictly U. S. P.," but do they all follow the official standard in the procedures and menstrua directed for different fluid extracts? That is the question. Some are frank enough to admit that they use methods of their own devising for drug-exhaustion, and then evade the question of menstrua used, holding that their preparations represent those of the Pharmacopœia if the drug has been exhausted of all the proximate principles soluble in the particular menstruum *they* employ, despite the apparent intention of the Pharmacopœia to have a preparation of a *certain* alcoholic strength holding in solution *certain* proximate principles, some of which are soluble in that strength of menstruum *only*.

So, as regards the preparation of tinctures, the only right practice for the pharmacist lies in his buying the best quality of drugs, and making his own preparations. In this way there is safety—safety for the doctor who prescribes, the druggist who dispenses, and last, but most important of all, the patient who swallows the medicine.

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## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*The soluble ferments present in Penicillium glaucum* were extracted by E. Gérard by the following process: The matured fungi were triturated with sand and macerated with the smallest possible quantity of distilled water. The aqueous solution is concentrated in a vacuum, filtered, and precipitated with absolute alcohol; the flocculent precipitate obtained is a very impure mixture of ferments which are separated by taking up the coagulated albuminoid matter with a little water, filtering and again precipitating with absolute alcohol. The product, washed with ether and dried in vacuum, is a



whitish gray powder, composed of a mixture of various diastases and some nitrogenized matter.

The author was able to prove that beside invertin and diastase, this fungus secretes also a ferment acting like emulsin. He placed in a test tube 10 cc. of a solution (1 : 100) of amygdalin and added 0.10 gm. of the ferment extracted from *Penicillium*, and found after 24 hours that the amygdalin had entirely decomposed into glucose, essence of bitter almonds and hydrocyanic acid.—*Four. de pharm. et de chim.*, July, 1893, page 11.

*Trehalase—a new soluble ferment.*—The circumstance that, while trehalose is formed in mushrooms when these commence to produce their spores, it gradually diminishes as they approach maturity, and that glucose makes its appearance at this time, suggested to Em. Bourquelot the possible presence of a ferment converting the one into the other; he found the ferment for the first time in *Aspergillus niger*, and proposes to name it *trehalase*, in conformity with the name *maltase* designating the ferment of maltose. As this product acts not only on trehalose but also on maltose, two hypotheses present themselves—either that *Aspergillus* secretes only one ferment, but acting upon two sugars; or that two are secreted, each with its own proper activity. Investigating this matter further, the author found that the action upon trehalose is entirely destroyed at 63° C., while the action upon maltose still persists to between 74–75°, thus proving the probable presence of two ferments.—*Four. de pharm. et de chim.*, May, 1893, p. 497.

*Differentiation of  $\alpha$ - and  $\beta$ -naphthol.*—M. Aymonier uses the following reagent for distinguishing between  $\alpha$ - and  $\beta$ -naphthol: Potassium bichromate, 1 gm.; distilled water, 10 cc.; pure nitric acid, 1 gm. A few drops of this reagent produce with  $\alpha$ -naphthol an immediate black precipitate which darkens upon further addition of the reagent, while  $\beta$ -naphthol is not affected by the test. Salol, benzonaphthol, thymol and other phenols are likewise insensible to this reagent.—*L'union pharm.*, July, 1893, p. 334.

*Liquid antiseptic salol* was described by P. Reynier before the *Soc. de Biologie* as a product worthy of various application in surgery. It fuses at 40–42° C., and then remains liquid below that point for some time. Beside the combination with camphor, it combines also with iodoform and aristol, with which substances it



forms fluid and easily injectable mixtures—*Rev. de thér. méd.-chir.*, August, 1893, p. 404.

*Mercuric biniodide—solution in olive oil.*—For this purpose the olive oil is first purified by mixing 1,000 cc. of the oil and 300 cc. alcohol, leaving them in contact for several days and agitating occasionally. The alcohol is then decanted and the oil submitted to sterilization. For preparing the biniodide solution, the oil is heated for about ten minutes at a temperature not exceeding 110–115° C.; when the temperature has been reduced to about 65°, 40 cgm. of the mercuric salt for each 100 cc. of oil are gradually added, stirring with a glass rod. When solution has been effected, filter through sterilized cotton, into sterilized, yellow glass containers. The solution prepared in this manner is very permanent.—J. Delacour, *Jour. de pharm. et de chim.*, June, 1893, p. 603.

*The action of cotton on sublimate* has been demonstrated by Leo Vignon (*Laboratoire de Chim. appliq.*; *Jour. de pharm. et de chim.*, July, 1893 p. 13), whose investigation leads him to the following conclusions: Bleached cotton, immersed in dilute aqueous or alcoholic solution of sublimate, absorbs proportionately more mercuric oxide than hydrochloric acid; the mercury absorbed is only partially soluble in water as  $\text{HgCl}_2$ , a portion being retained as  $\text{HgO}$  and  $\text{Hg}_2\text{Cl}_2$ , and time diminishing the soluble quantity, and increasing that which is insoluble in water. These observations will be of service in the preparation of sublimate bandages.

*Acrylic acid* is prepared by C. L. Moureu from  $\beta$ -chloropropionic acid, for which the author gives his process, as follows:  $\beta$ -chloropropionic aldehyde,  $\text{CH}_2\text{Cl}-\text{CH}_2-\text{CHO}$ , is oxidized by nitric acid, of 1.47 density, gradually added; the reaction is very violent, and cooling is necessary; the product is heated over a water-bath, the container then surrounded with ice and cooled to 0° C. About two-thirds of the acid are recovered and placed over lime in a vacuum. For extracting the  $\beta$ -chloropropionic acid remaining in the drying oil, the latter is diluted with four times its volume of water, and exhausted with ether; the ethereal solution leaves upon distillation a syrupy residue, which is heated on the water-bath for several hours and solidified by cooling.

The resulting acid is heated with aqueous solution of potassium or sodium, and after cooling dilute sulphuric acid is added in a

quantity exactly calculated to saturate the alkali in excess and displace one molecule of acrylic acid. The liquid is then distilled until litmus is scarcely reddened, when about four litres of aqueous solution of pure acrylic acid will have been obtained. The analysis of the acrylates of lead and sodium gave, respectively, the following results, showing the purity of the acid :

Per cent. of Pb, . . . . .	59.45 found ; 59.24 calculated.
“ Na, . . . . .	24.32 “ 24.47 “

—*Four. de pharm. et de chim.*, July, 1893, p. 16.

*Emulsion of creosote by means of casein saccharate* is prepared by M. Léger, by adding 10 gm. each of saccharate of casein and water to a mixture consisting of 10 gm. each of creosote and alcohol. When, after several seconds' agitation, the emulsion is complete, sufficient water is added to make one liter. This preparation can be administered either by the mouth or rectally, and remains unchanged for a long time.—*L'union pharm.*, July, 1893, p. 297.

*Zirconium* is prepared by L. Troost (*Four. de pharm. et de chim.*, July, 1893, p. 76) by mixing intimately a quantity of zircon and the carbon of burnt sugar, and submitting this to the action of electricity under a slow current of carbonic acid gas, when the reaction takes place at once, producing a carbide of the formula,  $ZrC_2$ ; this is then decarbonized by the further gradual addition of zircon. The product is steel-gray and extremely hard; unalterable at ordinary temperatures, burns with a bright flame, when it is carbonized, and is attacked by hydrofluoric acid, even when this is very dilute.

*Thorium* is prepared by the same process from thorine, the product being less hard than zirconium, decomposing water and altering in contact with moist air. On remelting the thorium carbide with an excess of thorine, a small quantity of a metallic substance was obtained which was not altered by air.

*Selenium* was submitted to the action of three solvents for ten hours, at the end of which time it was found that an abundant precipitate had been yielded by potassium carbonate solution, while dilute lactic acid dissolved a notably smaller quantity, and saliva only traces. Physiological experiments proved it to be much more toxic than sulphur, while in certain skin diseases, used as a salve in the proportion of 2 gm. precipitated selenium to 30 gm. vaseline, it was

more efficacious than sulphur.—Dr. Demontporcelet and Ch. Féry ; *L'union pharm.*, June, 1893, p. 249.

*Estimation of uric acid.*—P. Ducong uses for this purpose a modification of Arthaud and Butte's copper hyposulphite test (see AMER. JOUR. PHARM., 1890, p. 134). Since the cupric hyposulphite solution is very alterable, the author prepares the following solutions, which, separately, are permanent :

*Solution 1.*—Pure crystallized copper sulphate 4.47 gm., sulphuric acid 5 drops ; diluted with distilled water to 1,000 cc.

*Solution 2.*—Hypsulphite of sodium, 45 gm.; potassium sodium tartrate, 45 gm.; diluted to 1,000 cc. with distilled water.

Every 10 cc. of a mixture of equal parts of these two solutions employed, indicate 1 cgm. of uric acid per litre of urine examined. The reaction takes place according to the formula :



—*L'union pharm.*, July, 1893, p. 329.

*Eczemine* is a ptomaine not found in normal urine, but occurs in urine during eczema. It is poisonous, a hypodermic injection having caused in a rabbit inflammation, fever and finally death. It forms a hydrochlorate, an auro-chloride, and a platino-chlorate, and yields precipitates with various acids, mercuric chloride and Nessler's reagent. Analysis assigns to it the formula  $\text{C}_7\text{H}_{15}\text{NO}$ .—*Acad. d. scien.*, May, 1893 ; *Four. de pharm. et de chim.*, July, 1893, p. 78.

*The test for blood in urine* with turpentine and tincture of guaiacum wood will not produce the blue coloration, according to Ferraro, if ammonium is present in the free state, even when blood is present in notable quantities. If ammonium carbonate in excess be added to a urine containing blood of faintly acid reaction, the above reagents produce the blue color, which, however, disappears under the influence of heat as ammonium is set free from the carbonate ; while with the direct addition of free ammonium the tests do not respond at all.—*Bollet. farm.*; through *Monit. de la pharm.*, May, 1893, p. 1270.

*For recognizing artificial coloring matters in wines* the following process is given in *Revue vinicole*, based on the property of a saponaceous solution of destroying the natural coloring matter of wine, while foreign colorants are not attacked : 5 cc. of hydrometric solution are mixed with 5 cc. distilled water, 5 to 10 drops



of the wine to be examined added, and the tint of the liquid noted by transmitted light or against a white background. By this test natural wine gives only a slight grayish tint ; fuchsine, intense rose-red ; cochineal, red ; hæmatoxylon, violet-red ; hollyhock, bluish-green ; red poppy, faint, pale brown ; phytolacca, rose-violet ; aniline violet, bluish-violet. The hydrometric solution employed must be of neutral reaction and must not contain a free alkali, since the latter would give the wine a green coloration. One cgm. of colorant per litre of wine can be detected by this test.—*Bull. de la Soc. de Pharm. de Bord.*, June, 1893, p. 175.

*Artificial coloring matters in butter* can, according to a writer in *le génie civil*, be determined by the following tests : If a certain quantity of butter be agitated with alcohol, and after standing for a few minutes the alcohol decanted and evaporated over a flame, the butter will yield nothing to alcohol. If it is colored with *annatto* the addition of sulphuric acid will cause a red brown deposit. The presence of *curcumin* will produce a deep red residue with hydrochloric acid, and intense brown with potassium and sodium, while subacetate of lead will cause a red precipitate if *saffron* be the coloring matter, and alkali a green one in presence of *carrot*, as a coloring agent.—*Bull. de la Soc. de Pharm. de Bordeaux*, June, 1893, p. 189.

*Mururé* is the name given by the natives to a Brazilian tree, the botanical source of which is unknown. The bark presents a brick-red color, with darker patches on the outer surface ; internally it is fibrous, grayish and rather hard. Upon incision a reddish, syrupy liquid exudes, which is of acid reaction, 1.100 density, and is called *vegetable mercury*. The physiological experiments show it to be poisonous, injections of the neutralized juice having caused death in various animals. The authors have detected the presence of an alkaloid, besides other principles.—H. Cathelineau and C. Rebourgeon ; *L'union pharm.*, July, 1893, p. 333.

## GLEANINGS FROM THE GERMAN JOURNALS. —

BY FRANK X. MOERK, PH.G.

*Zinc borate* is obtained as a precipitate by mixing hot filtered solutions of 25 gm. zinc sulphate in 250 gm. distilled water and 20 gm. borax in 500 gm. distilled water ; the precipitate is washed with cold distilled water until the washings give no further



precipitate with barium chloride solution. After drying, the compound forms an amorphous, white powder insoluble in water and alcohol, but soluble in both water of ammonia and hydrochloric acid. The frequent combination in prescriptions of zinc oxide and boric acid suggested the preparation.—W. Koll, *Pharm. Post*, 1893, 338.

*The iodine absorption of fats and fixed oils*, proposed by von Hübl which has proven such an important factor in the study of this class of bodies, despite the objectionable feature, first announced by its originator, of the continued deterioration of the standard solution, has received attention from a number of sources having for their object the correction of this defect. In the *Am. Jour. Pharm.*, 1893, 382, P. Welmans proposes a mixed solvent of ether and acetic acid. Dr. W. Fahrion (*Chemiker Ztg.*, 1893, 1100) substituted methyl alcohol for the ethyl alcohol in making the solution and examined the solution repeatedly during four weeks; the decrease in strength, after one month's standing was, for the ethyl alcohol solution, 33.6 per cent., while for the methyl alcohol solution it amounted to only 12.1 per cent.; the latter lost during the first twenty-four hours 1.1 per cent., the former 6.6 per cent. F. Gautter calls attention to the mercuric chloride and proves that apart from solvent and excess of iodine, which had previously been announced as matters of importance in getting trustworthy results, the presence of the mercuric chloride in varying amounts will give as results, variable iodine absorption figures, the greater the amount of mercuric chloride the higher the iodine absorption; probably the most important result obtained was that in the presence of the mercuric chloride the saturated fatty acids, like lauric and stearic, absorbed iodine. For these experiments a solution of iodine in carbon tetrachloride was used, the mercuric chloride was dissolved in the smallest possible quantity of absolute alcohol and diluted with carbon tetrachloride to make a solution of 5 gm. in 100 cc.; this introduced very little alcohol when added to the iodine solution. Gautter recommends therefore to omit the mercuric chloride in the iodine absorption tests, and as a simply alcoholic solution acts too slowly, he suggests an iodine solution in carbon tetrachloride; this solution is most rapidly made by stirring or agitating one gram iodine with small portions of the solvent at a time, decanting and adding another portion, etc., until all of the iodine is dissolved and the solution measures one liter. The sodium thiosulphate solution is made by dissolving 19.528 gm. in sufficient

water to make one liter solution. These solutions are titrated as in the original method by Hübl. To determine with them the iodine absorption of oils, etc., about 100 milligrams of a drying oil and 200 milligrams of a non-drying oil are weighed into a glass stoppered bottle, 50 cc. of the iodine solution added, agitated until the oil is dissolved, the iodine solution covered with a layer of water to prevent loss of iodine and allowed to stand fifty hours; the excess of iodine is then titrated by adding the thiosulphate solution until after agitation only a faint red color remains; the addition of a small quantity of starch paste is then made and the thiosulphate added until the mixture is completely decolorized. The difference in the sodium thiosulphate solution required in the blank and actual tests gives the quantity from which the iodine absorbed by the oil is calculated. The results obtained are notably lower than those obtained by Hübl's method, although they are proportionately about the same: Cotton-seed oil, 43-45; linseed oil, 76. and lard, 23-27.—Dr. F. Gautter (*Ztschr. f. anal. chem.*) *Südd. Apotheker Ztg.*, 1893, 133, 145 and 265.

*Headine*, a secret preparation, was found to consist of 68.73 per cent. acetanilide and 31.57 per cent. sodium bicarbonate.—Dr. A. Schneider, *Pharm. Centralhalle*, 1893, 364.

*Spiegler's albumen reagent* has been modified so that it is even a more delicate test for albumen detecting 1 in 350,000. Its composition: Mercuric chloride, 2.0; tartaric acid, 1.0; distilled water, 50.0 and glycerin, 5.0.—*Pharm. Centralhalle*, 1893, 424.

*Pure amylene (Pental)* is obtainable by a patented process as follows: Tertiary amyl alcohol is heated on a water-bath with an organic acid, like citric, tartaric or better than these with oxalic acid; the acid is heated to 60-90° and the alcohol allowed to run in a steady stream; the decomposition is effected at once, the amylene distilling off and carrying with it the greater part of the water. The residual oxalic acid can be used repeatedly; the amylene after washing and fractioning has a constant boiling point of 38°, and is perfectly free from amyl alcohol, foreign hydrocarbons, etc., being especially suitable for therapeutic uses.—*Pharm. Centralhalle*, 1893, 431.

*Thioform*, a substitute for iodoform, is a basic bismuth dithio-salicylate; attention is called to it in the treatment of ulcers and diseases of the eye and skin.—*Pharm. Ztg.*, 1893, 426.

*Mace.*—In the course of an investigation of a number of samples of mace, it was found that the tests relied upon for the detection of adulteration of mace with inferior varieties depending upon the presence and behavior of coloring principles (Am. Journ. Pharm., 1891, 188) might lead to error, since it was found that with some practice the test revealed small quantities of coloring matter not only in the genuine Banda mace, but also in the nutmeg. The color tests are best obtained by extracting mace first with petroleum-ether and then with ether; the ethereal solution is evaporated, the residue taken up with alcohol and the test made with the alcoholic solution. In this connection an observation was made which probably will be of considerable service in deciding upon the question of adulterated mace. The samples were extracted successively with hot petroleum-ether, ether and alcohol; the petroleum-ether extracts in the cases of Banda mace and nutmeg represent extract free from volatile oil.

Material.	Petroleum-ether Extract. Per Cent.	Ether Extract. Per Cent.	Alcohol (96 per cent.) Extract. Per Cent.
I. Dark Bombay, whole, . . . .	31'60	30'40	5'90
II. Light " " . . . .	34'60	29'50	3'30
III. Mixed " coarse powder, . . . .	30'40	36'70	
I. Dark Banda, selected, whole, . . . .	19'10	3'49	3'47
II. Light " " " . . . .	24'50	2'50	2'60
III. Commercial Banda, coarse powder, . . . . .	23'90	2'86	4'50
IV. Commercial Banda, coarse powder, . . . . .	—	2'14	—
V. Commercial Banda, coarse powder, . . . . .	—	3'21	—
VI. Commercial Banda, coarse powder, . . . . .	—	1'82	—
VII. Commercial Banda, coarse powder, . . . . .	—	3'10	
I. Nutmeg, . . . . .	31'70	0'60	1'40

The ether extracts are of a resinous nature, soluble in alcohol, and yield the color tests; the ether and alcohol extracts from the Bombay mace are both much deeper in color than those from the Banda mace. It will be noticed that the Bombay mace is not distinguished from the Banda mace so much by the difference in fat as it is by the ether extract, after the petroleum-ether extraction; Banda mace yielding a maximum of 3'50 per cent., while Bombay mace

yields about 30.5 per cent., or ten times as much.—P. Soltsien, *Pharm. Ztg.*, 1893, 467.

*The alkaloids of Lupinus albus.*—The powdered seeds are boiled with two successive portions of water, the decoctions united and evaporated to an extract consistency; this is mixed with some milk of lime and then dried by the addition of dry slaked lime. The dry powder is extracted with petroleum benzin (b. p. 85–150°); the solution is agitated with dilute hydrochloric acid and from this solution the alkaloids are liberated by potassa and extracted with ether. The ethereal solution upon evaporation left a honey-like crystalline mass, which by expression and the use of ether and benzin was separated into two alkaloids, one crystallizable, the other liquid and uncrystallizable (except when kept in vacuo over sulphuric acid, it then forms very deliquescent crystals). Both alkaloids are monacid, have the formula  $C_{15}H_{24}N_2O$ , and form aqueous solutions becoming turbid upon heating; they differ only in physical properties and the melting points of the salts. The liquid alkaloid is probably identical with the *lupanine* of Hagen extracted from *Lupinus angustifolius*; it yields a dextrogyre hydrochlorate melting at 131–132° and an aurochloride melting at 198–199°. The crystallizable alkaloid melts at 99° and forms salts which are more soluble and more fusible than the corresponding salts of the liquid alkaloid; the optically inactive hydrochlorate melts at 105–106°, the aurochloride at 182–183°.—A. Soldaini, *Arch. der Pharm.*, 1893, 321–345.

*The ethereal oil of male-fern.*—Dr. A. Ehrenberg obtained the following yields of oil from rhizomes collected at different periods; the rhizomes were of recent collection and air dried; from these, oil was separated by distilling with steam and extracting the oil from the aqueous distillate by the use of ether: April, 0.008 per cent.; June, 0.025 per cent.; September, October and November, 0.04–0.045 per cent. The ethereal oil submitted to Professor R. Kobert for experiment was pronounced by him to be a specific poison for the lower animals and to be an undoubted factor in the male-fern treatment for tape-worm. A preliminary chemical examination of the oil indicates that it consists of free fatty acids of which butyric acid predominates; of a number of esters of hexyl and octyl alcohol with the fatty acids commencing with butyric acid and including



pelargonic acid ; lastly of small quantities of aromatic bodies. The statement of Kobert that the oleo-resin of *Aspidium filix mas*, if deprived of the ethereal oil was of inferior action (Am. Jour. Pharm., 1893, 135) is also true of the oleo-resin of *A. athamanticum*.—*Arch. der Pharm.*, 1893, 345, 356.

*Siam benzoin*, examined by the method of analysis as described under Sumatra benzoin (Am. Journ. Pharm., 1893, 223), contained the following constituents : 0.3 per cent. of an oily, aromatic, neutral liquid, which was proven to be an ester of benzoic acid ; the alcohol, possibly cinnamyl or benzyl, owing to the small quantity, was not identified, but was found to give the odor of benzaldehyde when mixed with sodium hydrate and potassium permanganate ; 0.15 per cent. vanillin ; some free benzoic acid ; the greater portion of the benzoin is composed of two esters—the benzoates of benzoresinol and of siaresinotannol. The benzoresinol,  $C_{16}H_{26}O_2$  (of which about 5 per cent. was obtained), is identical with that found in the Sumatra benzoin ; it crystallizes especially well from acetone, forming groups of long, white prisms. The second alcohol, siaresinotannol, present to the extent of 57 per cent., has the formula  $C_{12}H_{14}O_3$ , in other respects it agrees with the resinotannol from the Sumatra benzoin. Siam benzoin is perfectly soluble in ether ; if this solution be agitated with a dilute solution of potassium hydrate, the entire liquid will suddenly solidify, forming a jelly-like mass, which, under the microscope, is seen to be a mixture of minute yellow needles and an amorphous mass. The crystals are potassium-benzoresinol, and their ready formation was availed of in the separation of the two alcohols.—Fritz Lüdy, *Arch. der Pharm.*, 1893, 461–480.

*Alkaline solution of peptonate of iron*.—15.5 gm. pure peptone dissolved in 80 gm. water are mixed with 185 gm. solution of oxychloride of iron, Ph.G. III, and the mixture carefully neutralized with solution of soda ; the precipitate is collected, washed until free from chlorine, warmed with 200 gm. simple syrup, solution of soda carefully added until the precipitate is dissolved and diluted with water to 1,000 gm.—(*Berl. Apoth. Ver.*) *Apotheker Ztg.*, 1893, 370.

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It has been brought to our notice that the exhibits of the manufacturing pharmacists at the Columbian Exposition are located in the gallery of the liberal arts building, and as from its position it is liable to be overlooked, we beg leave to here call attention to its position.

DRAGON'S BLOOD.<sup>1</sup>

BY PROFESSOR FLÜCKIGER.

In an article in the *Pharmaceutical Journal* of July 15, p. 47, Monardes is quoted as the first author who mentioned American dragon's blood. In his "Primera y segunda y tercera partes de la Historia medicinal de las cosas que se traen de nuestras Indias Occidentales que sirven en Medicine," Sevilla, 1574, page 78, the figure "El dragon" shows three pods of a tree from which the drug was collected in the time of Monardes, in the country of Carthagera. One of the pods is open and exhibits the outline of an animal of the fabulous kind of a dragon, just as described in the said paper in the words of Gerard's "Herbal."

The question to be solved is, says the author of the paper inserted in the *Pharmaceutical Journal* (from *Gardeners' Chronicle*), what was the fruit mentioned by Monardes, which contained so striking a verisimilitude to a dragon?

The figures of Monardes are so extremely crude that they cannot afford any idea of the plant to which they belong. Still, they may be allowed to represent the pods of some species of the leguminous order.

Dragon's blood was certainly never an important article of commerce in Europe, and that from Carthagera probably made its appearance in the market but very irregularly, and has completely disappeared long ago. It was, however, to be met with at that time; thus we find it plainly described by one of the most competent pharmacologists of the middle of our century. Theodore W. C. Martius (see Hanbury's "Science Papers," p. 7 and 25), Professor of Materia Medica in the Bavarian University of Erlangen (+1863), enumerates three varieties of dragon's blood in his "Grundriss der Pharmakognosie," Erlangen, 1842, p. 366 to 369, viz: that from Calamus, that from Dracæna (see "Pharmacographia," 2d edition, p. 672 to 676), and, thirdly, that from Carthagera, the source of which according to Martius, is *Pterocarpus Draco*, L. This tree having been named by Linné, the knowledge of its product must have induced Linné to bestow on it the specific name of *Draco*. *Pterocarpus Draco*, indeed, is pointed out as the mother plant of the drug under notice as early as A. D. 1749, in the first edition of

<sup>1</sup> From Pharm. Jour. Trans., Aug. 5, 1893, p. 108.

"Caroli Linnæi Materia Medica," Liber I, De Plantis, p. 184, No. 522. It is true that Java and India orientalis were erroneously stated by Linné to be the native countries of the tree.

The description of the resin, as given by Martius, is so accurate that we may feel quite sure that he had it before him. Whether he had actually the opportunity of ascertaining its botanical origin must remain unsettled. But Lindley already, in his "Flora Medica" 1838, p. 257, mentioned *Pterocarpus Draco* as yielding the red juice from the wounded stems; he also quoted a statement of Jacquin's to the effect that large quantities of that dragon's blood had once been exported from Carthagera to Spain. When Jacquin paid a visit to Carthagera, between 1754 and 1759, he found the commerce in dragon's blood had almost ceased. In his "Enumeratio systematica plantarum quas in insulis Caribæis vicinaque Americæ continente novas detexit," etc., Lugduni Bat., 1760, t. 183, N. I. Von Jacquin figured the tree under the name of *Pterocarpus officinalis*, whereas in Hayne's "Darstellung und Beschreibung der in der Arzneikunde gebräuchlichen Gewächse," t. IX, pl. 9, the name of *Pterocarpus Draco*, Hayne, was applied to the tree which is now known as *Pterocarpus suberosus*, DC.; it is a native of Guiana.

Guibourt was also acquainted with the dragon's blood from the West Indian Islands, which he ("Histoire naturelle des Drogues simples," II, 1869, 139, and III, 346) attributed to Linné's *Pterocarpus Draco*; he says the resin was very rarely to be met with.

It would appear, therefore, that we may unhesitatingly regard that tree as the source of the dragon's blood discovered near Carthagera by the Spanish invaders. Its corky indehiscent pod of nearly orbicular outline tolerably answers to the figures of Monardes, and the solitary, kidney-shaped seed, if duly shrivelled, may remind, in the eyes of a fantastic observer, of what he supposes to be a dragon.

In India, *Pterocarpus Marsupium*, Roxb., affords the exudation called kino, which is but little used now. It would be desirable to investigate the chemical composition of the dragon's blood of the *Pterocarpus Draco*, and to examine whether it does or does not agree with the kino of the nearly allied species, *P. Marsupium*, of Malabar. On applying to Jamaica, the material for such an investigation would probably be obtainable. It would be desirable to know whether two trees so closely allied, like the two species of *Pterocar-*



*pus* just mentioned, could yield products so widely different as are kino on the one side and true dragon's blood on the other. In the careful monograph of dragon's blood by Lojander, *Beiträge zur Kenntniss der Drachenblutes* " Strassburg, 1887, the author only mentioned briefly the drug of *Pterocarpus Draco*, which he had not at his command.

We may anticipate that it rather belongs to the numerous class of kinos, the exudations of several species of eucalyptus, as well as of *Pterocarpus Marsupium* and other trees. Whether they are chemically identical or not, remains to be studied.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*Reactions.*—A Selection of Organic Chemical Preparations, important to Pharmacy in regard to their Behavior to commonly used Reagents. By F. A. Flückiger, Ph.D., M.D. Translated, revised and enlarged by J. B. Nagelvoort. George S. Davis, Detroit, Mich. 8vo. Pp. 154. Price, cloth, \$2.00.

This excellent work describes reactions of a large number of organic preparations, natural as well as artificial, and can well be recommended to all pharmacists and pharmaceutical chemists. In the work before us we find not only the older well-known reactions, but quite a number of new ones.

The book furthermore contains, as a frontispiece, a portrait of Prof. Flückiger, and the fac-simile of a letter to the translator.

*Pharmacographia Indica.*—A History of the Principal Drugs of Vegetable Origin met with in India. By Wm. Dymock, Brigade Surgeon, retired, etc. C. J. H. Warden, Surgeon Major Bengal army, etc., and David Hooper, Quinologist to the Government of Madras, Ootacamund. London: Kegan, Paul, French, Trubner & Co., Ltd. 1893. Part vi, p. 313-642.

Since the publication of part 5 of this valuable work, one of the authors, Dr. Wm. Dymock, has died, and this, part vi, is fittingly opened by a eulogy of this scientist. This part is the second half of the third volume of the work, and comprises the remainder of the monochlamydeous, and the apetalous orders of the dicotyledons, the gymnosperms, the monocotyledons, filices, lichenes, fungi and algæ. Of the plants used in North America as well as in India mention might be made of *Cannabis Sativa*, leaves, tops and resin, collected all from the female plant, "which the natives consider to be the male plant, because it bears the seed." *Ficus Carica*, fig, is now cultivated in India by Mohammedans and Hindus; other species of *Ficus* are used medicinally. *Antiaris toxicaria*, upas tree, has the poisonous qualities only in the male plant. Galls of *Quercus infectoria*; *Juniper berries*; *Taxus baccata*; *Curcuma zedoaria*; *Indian arrowroot* obtained from *Curcuma angustifolia*, *C. leucorrhiza*, *C. montana*, *C. longa*, *C. aromatica*, *C. rubescens*, and *Hitchenia caulina*; *Curcuma longa*; *Zingiber officinale*; *Elettaria Cardamomum*; *Alpinia officinarum* is a stomachic tonic, and is used by native Indian practitioners to reduce the quantity of urine in diabetes; *Crocus sativus*; *Aloe* is used by Moham-



medans as aperient, deobstruent, depurative, anthelmintic and tonic, as a collyrium for strengthening the sight and removing styas on the eye-lids, furthermore for the dispersion of swellings and the promotion of granulations; *Areca catechu*, betel nut, the unripe nuts are described by Hindu writers as laxative and carminative, the fresh nuts as intoxicating and productive of giddiness and when dried are said to sweeten the breath, strengthen the gums, remove bad tastes from the mouth, and produce a stimulant and exhilarating effect on the system; early Arabian writers describe it as good for hot and gross humors, prepared as a liniment, for inflammation of the eyes, as a collyrium, and of great efficacy for drying up the seminal fluid and as a digestive; *Calamus Draco*, the resin from this plant did not constitute the original dragon's blood, this being exported, according to early writers on eastern commerce, from Arabia and Socotra. *Acorus Calamus* is described by Mohammedan writers as deobstruent and depurative, useful for the expulsion of phlegmatic humors, which they suppose to be the cause of paralysis, dropsy, and many diseases, they also prescribe it internally in calculous affections. It has a reputation as a diuretic, emmenagogue and aphrodisiac, and is used as a poultice to paralyzed limbs and rheumatic swellings; a pessary of calamus, saffron and mare's milk is used to promote delivery. In Ceylon the rhizome is also used as an anthelmintic.

What we would further say about this interesting work would be a repetition of the reviews of former parts of this same work and we therefore simply refer to them.

*Charaka-Samhita*, translated into English. Published by Avinash Chandra Kaviratna, practitioner of the Hindu System of Medicine, etc., Calcutta.

We noticed the first four fascicles of this treatise on pages 286 of our last volume and 107 of the present one, to which we would like to refer. We have now before us fascicles 5 and 6 treating in five lessons of wind (gases) of oils and their uses and administration, of Sweda (often used to signify the application of heat or fomentations even when the end sought is not diaphoresis; it includes also warm water baths, vapor baths and hot cataplasms of medicinal plants), of articles which should be at hand where untoward effects of emetics and purgatives show themselves; of the skillful physician, and of some diseases of the head.

*Contribution à l'étude histologique des Zingiberacées*.—Thèse pour l'obtention du Diplôme de Pharmacien de 1<sup>re</sup> Classe présentée et soutenue par Gilbert Joseph Barthelot. Lons-le-Saunier, Lucien Declume, 1893.

Contribution to the histological study of the Zingiberaceæ, Thesis to obtain the diploma of pharmacist of the first class, presented and sustained by Gilbert Joseph Barthelot. Lons-le-Saunier, Lucien Declume, 1893.

The author from his work draws the following conclusions: There exists a great analogy in structure between the plants of this natural order. The sclerotic arc encircling the vascular bundles is constant in all organs except in the rhizome where it is occasionally wanting. The rhizomes with few exceptions contain large quantities of starch. The cells secreting essential oil vary considerably in number, are always distributed singly in the parenchyme tissue, the cell walls not containing suberine as has been stated by several authors. In all organs tannin bearing cells are found varying in number and shape. The

thesis is accompanied by four excellently executed photogravures of longitudinal and transverse sections of *Zingiber officinalis*, *Costus villosus*, *Curcuma longa* and *C. zedoaria*, *Hedychium gardnerianum*, *Alpinia galanga* and *Curcuma leucorrhiza*.

*Ueber Hyoscin und Oscin. Ueber Cinchonin. Notiz über Tagetesblüthen.*

*Vorläufige Mittheilung über Chinin, Cinchonidin und Conchinin.* Von O. Hesse. Besonderer Abdruck aus Liebig's Annalen der Chemie. Band 276.

On Hyoscine and Oscine. On Cinchonine. Note on *Tagetes florets*. Preliminary Notes on Quinine, Cinchonidine and Conchinine (Quinidine). By O. Hesse. Reprint from Liebig's Annalen der Chemie. Vol. 276.

Will take the liberty of offering more extended extracts from the above in our next number.

*Pharmacopœa Danica*, 1893. Kjöbenhavn. H. Hagerups, Forlag, 1893.

*Pharmacopœia Danica*, 1893. Copenhagen. H. Hagerups, Publisher, 1893.

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## OBITUARY.

*Dr. George Randolph Parry*, Ph.G., died at his residence, New Hope, Bucks County, Pa., June 12, 1893, aged 53 years. He was born in Philadelphia, Sept. 3, 1839; learned the drug business with Charles Ellis, Son & Co., and graduated from the Philadelphia College of Pharmacy in 1862; studied medicine and graduated from the University of Pennsylvania in 1867. He began the practice of medicine at Union Springs, New York, and in 1880 removed to New Hope, Pa., where he built up a large practice. He was a member of the Bucks County Medical Association and the Historical Association of Pennsylvania. He leaves a wife and two daughters.

*John Thomas Hoskinson, Jr.*, Ph.G., died at his late residence, northwest corner of Front and Norris Streets, July 29, 1893, aged 43 years. He was born at Chambersburg, Pa., learned the drug and apothecary business with the late Daniel S. Jones, Ph.G., and graduated from the Philadelphia College of Pharmacy in 1871. He was in active business at Front and Norris Streets for several years. He was a member of the Executive Board of the Alumni Association, of the American Pharmaceutical Association and of the Pennsylvania State Pharmaceutical Association, in all of which he took an active interest, attending their various meetings.

*Edward Hopper*, Ph.G., Class of 1833, died at his late residence, No. 1206 Spruce Street, August 7, 1893, aged 82 years. He learned the drug business with John Hart, and graduated from the Philadelphia College of Pharmacy. He started in business for himself soon after, but soon relinquished the drug business and studied law, entering the office of John Sergeant, and was admitted to the bar October 31, 1839, enjoyed a large practice principally in the Orphans Court and had an extended knowledge of real estate. He was a manager of Will's Hospital and President of the Orthopædic Hospital. He was a member of the Society of Friends, and attended the meeting at 9th and Spruce Streets, and frequently preached with confidence and earnestness. For the last 20 years of his life he was a victim of facial neuralgia, and the last 8 months was confined to his house; at the time of his death he was one of the solicitors of the college.



DIED SEPTEMBER 10, 1893.

Prof. John Michael Maisch, Phar. D., Ph. M., etc.

EDITOR OF THIS JOURNAL.

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A Memoir will appear in a subsequent  
number.



# THE AMERICAN JOURNAL OF PHARMACY

OCTOBER, 1893.

## SUMBUL RESIN.

By PHILIP H. UTECH, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.  
No. 128.



In the preparation of this resin 1,000 grams of the root were taken, and reduced to a coarse (No. 20) powder. It was then macerated, first in water, and subsequently in a solution of sodium carbonate, after which it was again washed with cold water, and allowed to dry at a temperature of  $15^{\circ}$  C.

During this operation the drug lost 42 per cent. of its weight, consisting largely of extractive matter, albuminoids, etc. A second portion was experimented on with approximately the same results.

The drug was then percolated with alcohol, and the resulting tincture agitated with lime and filtered. A little sulphuric acid was added to decompose the lime, and the tincture then agitated for some time in contact with animal charcoal, and again filtered.

The alcohol was recovered by distillation, and the residue poured into water. There was precipitated a soft, whitish, translucent resin, which on drying in an air bath at  $110^{\circ}$  C., yielded a clear, transparent, amber-colored product, having a bitter taste, and possessing the aromatic odor of the root. The yield was 6.1 per cent.

This resin was completely soluble in chloroform, ether, carbon disulphide, acetone, benzol and acetic ether; but only partly dissolved by petroleum ether, and 36 per cent. acetic acid. It was almost insoluble in solution of ammonia.

On igniting 4 grams of the resin on platinum, it burned with a sooty flame, and left 50 milligrams of ash.

Hydrochloric acid partly dissolved the resin and the mixture acquired a violet-blue color resembling "purple of Cassius," which, however, soon faded to a brown. Sulphuric acid completely dissolved the resin with the production of a thick blackish liquid, and on adding the solution to water the resin was reprecipitated. With nitric acid the resin imparted but a slight coloration to the liquid, although it assumed a dark, reddish color itself.

On adding 1 cc. of fuming nitric acid to 1 gram of the resin, a rapid oxidation occurred, attended with copious evolution of nitrous fumes, and left as a product of the oxidation, a brown, waxy substance which was readily soluble in alcohol. This alcoholic solution, when added to water and filtered, gave a lemon-yellow solution, which in its general behavior towards reagents, corresponded to picric acid.

The resin was but slightly soluble in solutions of potassium or sodium hydrate. An alcoholic solution of the resin was not affected by ferric chloride.

When fused with potassium hydrate, a brownish mass was formed, a portion of which was soluble in water, and the insoluble portion dissolved in glycerin on warming. On acidulating the aqueous solution with diluted sulphuric acid, agitating with ether, decanting the ethereal layer, and allowing the same to evaporate spontaneously, the residue, when dissolved in water, gave a clear colorless liquid, which decolorized an acid solution of potassium permanganate. It was further tested with solutions of ferric chloride, ferrous sulphate, and silver nitrate, but its identity with the di-acid phenols could not be established.

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## THE UNITED STATES PHARMACOPŒIA OF 1890.

BY GEORGE M. BERINGER, A.M., PH.G.

The appearance of the seventh decennial revision of the Pharmacopœia of the United States has been patiently awaited by the pharmacists of America. The labors of the committee, extending over a period of more than three years, suggested the hope that the present revision would be perfect. The committee cannot be accused of hastily completing their work and the product, a book of over six hundred pages, gives evidence throughout of the desire to make this the most scientific of all the national pharmacopœias. The acknowledged talent of the gentlemen composing the commit-

tee of revision, assured in advance the scientific character of the work, but there is no lack of evidence of the want of that *practical* knowledge of the pharmacy of to-day acquired only by personal contact with customers.

That errors should have crept into a book of such vast scope and numerous titles is but natural, and the committee have added a final page of errata and addenda which they have discovered, but these are by no means all. After a careful examination of the book, the writer is forced to conclude that it is far from perfect and that the mistakes of the present revision will furnish ample work for the revision of 1900.

The typography of the work and binding are fair and the price at which the book is sold is satisfactory and should tend to make it much more popular than the previous revision of 1880. From January 1, 1894, it becomes the legal authority for all official products, and it is to be noted that *official* and not *officinal* has been stamped authoritatively by the committee.

The present review is offered from the unbiased standpoint of a practical pharmacist, whose daily companion the volume will be and it is supposed to be mainly prepared for the use of this class.

I would suggest that, in the future revisions, the proceedings of the convention authorizing that revision alone be published as the history of the earlier conventions and pharmacopœias can be obtained from the previous revisions. This would have eliminated ten pages from this edition. The book is replete with tables and lists as aids in the various calculations and testings, giving it much the appearance of a modern text book of chemistry. In this respect very little more could be desired, and some might have been here omitted as they will appear in the dispensatories and various compends. That most practical and often enquired after *Official table of doses* is omitted. In the writer's experience, this is quite as much needed by our medical brethren as by those of the pharmaceutical craft. In the table on page LVIII, we are informed that the strength of decoctions and infusions in the Pharmacopœia of 1890 is "about 1 in 5" instead of 1 in 20, or about five per cent. as in the text of the book. The Pharmacopœia of 1880, stated the weight of a fluidounce of water as 455.7 grains, that of 1890 states "456.392 grains at maximum density in vacuo," and this method is generally adopted in the tables. Scientifically accurate, but the pharmacist

needs these tables as aids to his commercial operations, which are not conducted in vacuo and rarely at the temperature of maximum density, and it would have been more to the purpose to have supplied him with tables of equivalent weights and measures computed for normal temperature and pressure instead of at 4° C. and in vacuo.

It is regretted that in the adoption of the Centigrade scale for temperatures that the equivalent in the Fahrenheit scale is added after each statement of temperature. The adoption of the metrical system of weights and measures is commendable and in harmony with scientific works over the entire globe. The system of parts by weight adopted by the Pharmacopœia of 1880 was regarded only as a compromise, a step in the education of the pharmaceutical and medical professions toward the universal adoption of the metrical system. With but few exceptions, such as making the dilute acids and mucilage of acacia, parts by weight have been dropped and the "un-American" idea of weighing liquids as a principle has been relegated to the past. If the pharmaceutical and medical writers will now refrain from transposing these weights and measures, they will compel the masses to think in the metrical system. This point attained, they will soon learn to understand and appreciate its usefulness.

Prior to, and at the time of, the convention in May, 1890, much had been written and said regarding standardization of the preparations of the organic drugs. After careful consideration, the committee have introduced methods of assay for cinchona and opium and for preparations of opium and nux vomica. We endorse the reasons assigned for such limitation on page XXX. The lime method for assay of opium, of the U. S. P. 1880, is discarded and Squibb's process is adopted, with the following slight modifications: Tared filters are not used. The crystals of morphine, after washing with water, are washed with alcohol saturated with morphine (it is apparent that at this part of the process the evaporation of the alcohol must be guarded against or a slight error will be introduced), subsequently washed with ether and dried at 60° C. and transferred to a tared watch crystal and weighed. No test is applied for the purity of the resulting morphine.

For the assay of cinchona, the process of 1880 was also discarded and a modification of Prollius' method for total alkaloids adopted. The product from the first extraction by a mixture of



alcohol, chloroform and ammonia is purified by conversion into sulphate. The filtered solution rendered alkaline by potassa, is extracted with chloroform. The evaporated chloroformic solution, dried and weighed gives the *total* alkaloids. For determining the percentage of quinine, the purified chloroformic solution, from 5 grm. of bark is evaporated on powdered glass and then extracted by slow percolation with ether until 10 cc. of percolate is obtained, this is evaporated and weighed. The percolation with ether is continued until another 10 cc. is obtained and this is likewise evaporated and weighed. The weight of the second deducted from the weight of the first portion and the result is assumed to give approximately the weight of quinine, and multiplied by twenty, the percentage.

For the assay of extract of *nux vomica*, the following process is adopted: 2 grm. of the extract dried at  $100^{\circ}$  C. is treated with a mixture of alcohol and water and water of ammonia and the alkaline liquid is extracted with chloroform. The chloroformic solution is evaporated and the residue extracted with 10 cc.  $\frac{n}{10}$  sulphuric acid and hot water and then titrated with  $\frac{n}{100}$  potassic hydrate solution using Brazil wood solution as an indicator. The number of cc. of the  $\frac{n}{10}$  sulphuric acid found to have been neutralized by the alkaloid, multiplied by the factor 1.82, gives the percentage of the total alkaloid. A. H. Allen has recommended methyl orange as the indicator in strychnine titration. The process should direct *distilled* water, as the degree of hardness of natural water, would materially affect the results in such delicate determinations.

The descriptions of the official chemicals and many of the vegetable products, are accompanied by copious tests for identification and determination of purity and in this respect very little more could be desired, and in many cases the requirements are too stringent for medicinal chemicals.

Ninety-two articles have been dismissed from the Pharmacopœia. The list published on pages XLIX and L contains but ninety titles but we suppose that *tinctura ferri acetatis* and *vinum aromaticum* were dismissed and not inadvertently omitted. It is significant of the present tendency of medication towards the use of chemical remedies that of these, twenty-seven were of vegetable origin and but thirteen of chemical derivation, and of the latter *æther*, *chloroformum venale* and *sodii bicarbonatis venale* represent but titles as the purified products remain. The same may be said of the title

*cinchona flava*, dismissed as the title *cinchona* now includes the bark of *cinchona calisaya*, *cinchona officinalis* and of hybrids of these and other *cinchonas*. It is to be noted that the alkaloidal requirement for all official *cinchonas* has been increased to five per cent. total alkaloids which conforms with the *best* grades of *cinchona* now in the market. None of the vegetable drugs dismissed were sufficiently used to be retained, and the following should also have been excused from the official list as they would not be missed, *cascarilla*, *chelidonium*, *illicum*, *melissa* and *sabina*.

It is not a new proposition but a well-founded one, that the Pharmacopœia should not recognize any drug that is not prescribed in the crude state without introducing some official preparation of that drug. This would exclude *caulophyllum*, *inula* and *marrubium* of which fluid extracts should be official and *staphisagria*, *pulsatilla* and *toxicodendron* of which tinctures should have been introduced.

Inspissated ox-gall is the only drug of animal origin dismissed and this was unnecessary as the purified ox-gall answers all requirements.

Fifty-one preparations have been dismissed. The entire class of abstracts have been abstracted. This grand experiment of the Pharmacopœia of 1880, proved a most miserable failure. It must not be lost sight of, that those who are to use the Pharmacopœia, are practical medical practitioners and pharmacists and that their desires and needs must be supplied and not theories and experiments offered in their stead. They want powdered extracts and will prescribe them and use them daily and hourly. The Committee knows this, yet, with the exceptions of extract of opium and extract of *nux vomica*, this demand has been unheeded. The consumption of dry or powdered extracts of *aconite*, *belladonna*, *cannabis*, *colchicum*, *conium*, *gentian*, *hyoscyamus*, *stramonium*, etc., is enormous. Was the working out of formulas for these too non-scientific, too practical to engage the attention of the Committee? Manufacturers would most likely have furnished the necessary information.

*Acetum lobeliæ* and *acetum sanguinariæ* both excellent preparations for exhibiting the action of their respective drugs, having become neglected by the medical fraternity, are dismissed. The dismissing of infusion of *kousso*, was surely an error. The action of this drug is admittedly largely mechanical and the Pharmacopœia

of 1880, directed rightly that this infusion should be dispensed unstrained. It is now dismissed and the almost unused and probably inert fluid extract retained. *Liquor pepsini* has been dismissed, nor has any liquid preparation of this remedy been introduced, although several are greatly used.

*Mistura Magnesia et Asafoetidæ* has been dropped. Dewee's Carminative is again relegated to its proper position along with Godfrey's cordial, Bateman's drops, British oil and the other semi-proprietary remedies of the past generations.

I cannot refrain from noting here that the *Mistura Potassii Citratis*, 1880, has been dismissed. Under *Liquor Potassii Citratis*, *Mistura Potassii Citratis* is given as a synonym. That *Mistura Potassii Citratis*, 1880, is superior to *Liquor Potassii Citratis*, is beyond dispute, and both physicians and pharmacists have been taught to discriminate in favor of the former. The reason for such change is not apparent, as disuse cannot be urged and the Pharmacopœia cannot be presumed to endorse that substitution of the solution for the mixture, that has been indulged in by some mean-spirited druggists. I would suggest that physicians desiring *Mistura Potassii Citratis* made with lemon juice, should in future write *Mistura Neutralis*, which synonym, fortunately, remains unconfiscated, and that pharmacists recognize this intent.

Eighty-eight titles compose the list of additions to the Pharmacopœia. But three drugs are of animal origin, namely, *Adeps Lanæ Hydrosus* (the official name for what is generally known by the proprietary name Lanolin), *Pancreatin* and *Pepsin*. It is significant that thirty-four of these additions are of chemical origin and but thirteen of vegetable, while thirty-eight are preparations of which fourteen are fluid extracts.

The chemicals introduced are, as a rule, those whose use warrant recognition. The old notation has been discarded in the chemical formulas, it was already obsolete when introduced in 1880.

Surprisingly few are the changes in the titles of chemicals. Arsenious acid is now *arsenous*, and the titles of the official arsenical products changed in spelling to correspond. The Committee have deemed the changes in the spelling and pronunciation of chemical terms proposed by the American Association for the Advance of Science<sup>1</sup> too radical, and have contented themselves with such minor

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<sup>1</sup> See American Journal of Pharmacy, 1893, 178.



changes as placing the metallic or basylous radical first in the English names, as sodium chloride instead of chloride of sodium, and in using the terminations *ous* and *ic* in the salts of mercury and iron to denominate the atomicity of the basic element in combination. Would it not have been more in accordance with established ideas to have written sodic chloride, potassic nitrate, plumbic carbonate, etc.? Surely, the titles of alkaloidal salts should have been changed, so as in each case to indicate the true composition. Cocaine hydrochloride, morphine hydrochloride, and hyoscine hydrobromide are correct names and such a change would have been endorsed.

The following are among the few vegetable drugs introduced, Quebracho bark, Convallaria rhizome and rootlets, Yerba Santa and Cascara Sagrada. It is generally admitted that the action of cascara is modified and improved by keeping for one year after collection. This is officially required for Frangula, but has been overlooked for Cascara. Barbadoes Aloes is reintroduced and Strophanthus and Viburnum Opulus are deserved additions, and under the title of Zea, corn silk is introduced.

Saigon Cinnamon has been admitted, but it is to be noted that it is not directed to be used in a single formula; each formula carefully specifying either Cassia Cinnamon or Ceylon Cinnamon to be used. It is well known that the bulk of the powdered cinnamon sold in the drug trade is saigon, and that this is used to prepare pharmaceutical preparations of fine quality. Its use should have been sanctioned officially, at least, where cassia is ordered, otherwise there is no reason for its introduction.

Notable changes in titles are Cusso for Brayera, Coca for Erythroxylon, Oleum Bergamottæ for Oleum Bergamii. A number of the changes made are not indicated by the titles. Amylum is now corn-starch and not wheat-starch, as heretofore. Long-leaved buchu is no longer recognized. Calendula is rightly florets only and Euonymus, bark of Root. Colchici Radix, on page 96, is stated to be "the *corm* of Colchicum autumnale, L.," now a corm is recognized as part of the *stem system* and not of the root, so the title should be Colchici Cormus.

Granatum is the bark of both the stem and root of Punica Granatum, L., in accordance with what has been in commerce for years. Grindelia includes both species, robusta and squarrosa. In the Phar-



macopœia of 1880, a curious mistake was made regarding Witch-hazel. Under the title of Hamamelis, the leaves were introduced and a formula for a fluid extract thereof. True, the so-called distilled extract or water had been made from the freshly-gathered twigs and leaves, but under the official title of the drug, the dispensaries described the medicinal action of the bark. The writer knows that the bulk of the fluid extract, made up to that time, and even since, has been made from the bark. In the report of the Committee on Pharmacopœia of the Philadelphia College of Pharmacy, which was presented to the Convention in 1890, it was recommended that the bark be admitted into the Pharmacopœia and that a fluid extract of the same be also introduced. Yet the present revision continues this error.

Oil of Anise, from *Anisum*, is alone recognized under that title, the description being such as to exclude the oil from *Illicium*. Although the oil from *anisum* has, in recent years, been produced in very much larger quantities than formerly and at greatly reduced prices, the bulk of the oil consumed is still that obtained from the star anise.

Our Western *pulsatilla* from *Anemone patens* L. var., *Nuttalliana*, *Gray*, is no longer recognized, *Pilocarpus* includes both the Rio Janeiro and the Pernambuco *Jaborandis*. In the botanical classification of the plants it is to be noted that sub-orders are not given and that several of the natural orders given in the U. S. P. 1880 have been reduced from their ordinal standing, so that plants previously classified as natural order Zingiberaceæ are suppressed into Scitamineæ, Granataceæ into Lythrarieæ, Erythroxylaceæ into Lineæ, Melanthaceæ into Liliaceæ, and Aurantiaceæ into Rutaceæ.

[To be continued.]

## THE VALUE OF TITRATION WITH VOLUMETRIC ACID SOLUTION AS A MEANS OF ASSAYING ALKALOIDAL DRUGS AND GALENICAL PREPARATIONS.

BY CHARLES CASPARI, JR., PH.G., AND ALFRED R. L. DOHME, A.B., PH.D.

Read at the meeting of the American Pharmaceutical Association.

Some time since one of us (C.) made mention<sup>1</sup> of the fact that a series of investigations was in course of progress upon the subject

<sup>1</sup> Caspari, "A Few Remarks about Alkaloidal Assays of Drugs," *Pharmaceutical Review*, Vol. I, page 211.

of titration of alkaloidal residues from assays by means of volumetric acid solution. After considerable delay the work has been about completed by both of us, each working separately. As long as drugs have been assayed it has been customary to weigh the residue obtained by evaporating the final extract of the alkaloids by ether, chloroform or some other solvent, and to call it alkaloid. This is frequently accompanied by the statement that the alkaloids are or are not perfectly pure. How pure they are the sequel will very plainly show. Beckurts, Schweissinger and all the German pharmaceutical chemists have adopted titration with volumetric acid solution as the most accurate method that we at present have for assaying alkaloidal drugs, and there need be no reason why we should not adopt it, especially if the results of experience show how much nearer the truth we will be than when we used the gravimetric method alone. That this method is without blemish we do not claim; in fact, we are candid to say there are two questionable elements which enter into the problem, though only in one or two instances, and give rise to some doubts as to the absolute correctness of our results in these instances. Even allowing that an error has been introduced, and calculating this at its maximum, we find that the result obtained by the titration method is nearer the truth than the result obtained by the gravimetric method. The two elements that enter the problem and cause us to hesitate ere saying "correct," in the cases of *nux vomica*, *ipêcac*, *cinchona*, *aconite* and *gelsemium*, are: First, our imperfect knowledge of the molecular weights, or rather of the formulas, of some of the alkaloids, as, for instance, *emetine*, *gelsimine*, *aconitine*, etc., and second, the fact that some drugs (*nux vomica* and *cinchona* notably), contain several alkaloids possessing different molecular weights, and this compels us to assume that they are present in certain proportions in order to get the molecular weight from which to determine our percentage of alkaloids present. The first difficulty cannot be obviated until more exact analyses and formulas are forthcoming, and confronts us but seldom. The second difficulty can only be obviated by determining in each case by a separate assay just how much of each alkaloid is present. This presents itself in five cases, *nux vomica*, *jaborandi*, *veratrum viride*, *cinchona* and *aconite*. When we consider what great strides nearer to the truth we have taken in case of the remaining alkaloids (see the results below), and that we have in their cases results which

we know to be absolutely correct, it is our opinion that the method of titration with volumetric acid solution is by far the most reliable method we possess to-day for assaying alkaloidal drugs. In all cases we used the fluid extracts of the drugs examined. Some trouble was experienced in getting an indicator that would give a sharp end reaction in case of slightly-colored solutions, but a decoction of Brazil wood containing a little alcohol was found to answer all purposes. Our plan of procedure was as follows:

Four separate and distinct methods of assay were undertaken in case of each fluid extract examined, and the amount of error in each determined by means of titration with volumetric acid solution. The methods adopted were those of Lyons, Lloyd, Beckurts and Thompson. By employing these, as prescribed in their method, we obtained the usual gravimetric results given in the columns below, headed "gravimetric." The residues were then dissolved in a known quantity of decinormal hydrochloric acid dropped into the beaker from a graduated burette, using a little heat by placing it on a water-bath, if the alkaloids resisted solution due to the presence of resin, gum or other impurities. After cooling, the indicator was added, about 10 or 12 drops, and the excess of acid determined by means of a volumetric alkali solution, whose relation to the decinormal acid solution we know; the alkali solution being added until the solution became cardinal to purplish red in color, indicating an excess of alkali. The number of cubic centimeters of alkali solution used were then, after being converted into their equivalent of decinormal acid solution, subtracted from the original amount of decinormal acid solution added. This gave the amount of decinormal acid that had been used to neutralize the alkaloids present in order to form with them their hydrochlorides. We know that for every 36.37 grammes of hydrochloric acid used there must be present an amount of alkaloid equivalent in grammes to its molecular weight, provided the alkaloid is a monacid base. If it is a diacid base, as in case of ipecac, where emetine is known to be diacid, then 36.37 grammes of hydrochloric acid will neutralize, *i. e.*, indicate only one-half of the molecular weight, in grammes, of the alkaloid. To show the exact method employed in calculating the results recorded below, we will take the cases of belladonna root, nux vomica and ipecac root. The molecular weights of the three mydriatic alkaloids contained in belladonna root being all alike, we do not hesitate to represent it by



289. Those of the two alkaloids of *nux vomica*, strychnine and brucine, are respectively 334 and 394, and as we assume in this case that the two alkaloids are present in equal amounts, it follows that the molecular weight to be used in our calculations is the mean of 334 and 394, or 364. The molecular weight of emetine, the only alkaloid, at least non-volatile alkaloid, of ipecac root, is generally admitted to be 496, as the analyses made by Glenard<sup>1</sup> of the crystallized pure specimen of the hydrochloride of emetine yielded him figures, which when converted into a formula, gave  $C_{30}H_{44}N_2O_4 \cdot 2HCl$ . We thus see that  $C_{30}H_{44}N_2O_4 (= 496)$  or one molecule of emetine requires 2 HCl to neutralize it, therefore it requires only  $\frac{496}{2}$  or 248 grammes of emetine to neutralize 1 HCl, *i. e.*, 36.37 grammes of HCl. Our next calculation is to determine to how much alkaloid in grammes is one cubic centimeter of our decinormal hydrochloric acid solution equivalent? We proceed as follows:

1000 cc. of normal hydrochloric acid contain	36.37 grammes of HCl.
1 cc.                   "                   "                   "	0.03637                   "
1 cc. of decinormal                   "                   "	0.003637                   "

But

36.37 grammes of HCl will	{	364 grammes of <i>nux vomica</i> alkaloids.
neutralize and are hence		248 grammes of emetine.
equivalent to . . . . .		289 grammes of mydriatic alkaloids.

Hence

1,000 cc. of normal HCl are	{	364 grammes of <i>nux vomica</i> alkaloids.
equivalent to . . . . .		248 grammes of emetine.
		289 grammes of mydriatic alkaloids.

Or

1 cc. of decinormal HCl is	{	0.0364 grammes of <i>nux vomica</i> alkaloids.
equivalent to . . . . .		0.0248 grammes of emetine.
		0.0289 grammes of mydriatic alkaloids.

In this way we know the equivalent of 1 cc. of decinormal hydrochloric acid for every alkaloid or mixture of alkaloids, and can readily, from the number of cubic centimeters of acid used, calculate the amount of alkaloid present, and hence also the percentage of alkaloids.

The following tabular statement of results will show the relative gravimetric inaccuracies for each alkaloidal drug investigated by us in case of each method, and also the relative merits of the various methods investigated.

<sup>1</sup> See Beilstein, "Handbuch der Organischen Chemie," II edition, Vol. III, p. 539; also Husemann-Hilger, "Die Pflanzenstoffe," Vol. II, p. 1363.



FLUID EXTRACT.	GRAVIMETRIC.				VOLUMETRIC.			
	Method of Lyons.	Method of Lloyd.	Method of Beckurts.	Method of Thompson.	Method of Lyons.	Method of Lloyd.	Method of Beckurts.	Method of Thompson.
Aconite Root, . . .	0'311*	0'446	1'947	0'640	0'128	0'437	0'517	0'599
Belladonna Leaves, . .	0'300	0'428	1'445	0'380	0'289	0'315	0'339	0'318
Belladonna Root, . .	0'338	0'318	1'135	0'424	0'338	0'309	0'348	0'335
Bloodroot, . . . .	1'232	1'560	—	—	†	†	—	—
Cinchona, . . . .	3'41	3'49	—	4'70	3'21	3'20	—	4'40
Coca Leaves, . . .	0'969	0'806	—	0'680	0'563	0'533	—	—
Colchicum Seed, . .	0'682	0'600	—	—	†	†	—	—
Conium Fruit, . . .	0'567	0'699	—	—	†	†	—	—
Gelsemium, . . .	2'190	0'836	1'920	0'400	0'285	0'277	0'408	0'392
Henbane, . . . .	0'265	0'306	—	—	0'231	0'254	—	—
			Keller.				Keller.	
Ipecac, . . . . .	1'815	1'478	2'01	2'90	1'570	1'465	1'51	0'93
Jaborandi, . . . .	0'443	0'884	—	0'510	0'166	0'249	—	0'266
			Beckurts.				Beckurts.	
Nux Vomica, . . .	1'776	1'789	3'005	1'584	1'419	1'419	1'32	1'340
Stramonium Seed, .	0'966	0'318	1'058	0'296	0'289	0'218	0'192	0'295
Veratrum Viride, .	0'832	1'030	—	—	0'246	0'328	—	—

\* These figures all represent the percentage of alkaloids in the fluid extract, which in every case was taken from the same bottle for all the methods. The fluid extracts were of various makes.

† Alkaloidal residues were too deeply colored to admit of being titrated.

‡ Not titrated because of the volatility of the coniine, it having been weighed as hydrochloride.

#### CONCLUSIONS.

The conclusions to be drawn from these results have virtually been given in the text above. Summed up briefly they are :

(1) That titration with volumetric acid solution is the most reliable and trustworthy method of assaying alkaloidal drugs known to us to-day.

(2) That gravimetric results as heretofore generally reported and made use of are in many cases very wide of the truth, and hence unreliable.

(3) That some of the methods employed are better adapted to some drugs than to others, a perusal of the figures best showing this.

Inasmuch as several of these methods have never to our knowledge been applied to some of the fluid extracts examined, it might be of some value to mention here some of the modifications and changes made in them. The following table will, we hope, make this clear.

Fluid Extract.	Method of Lyons.	Method of Lloyd. +	Method of Thompson. Δ	Method of Beckurts. ΔΔ
Aconite Root,	See Lyons Manual, § 92.	Chlorof. ether.	+ Wherever there is a dash the regular method of Prof. Lloyd using his dried soda ferric hydrate mixture and plain chloroform has been employed. The chloroform ether mixture consisted of equal parts of each.	
Bellad. Leaves,	" " § 120.	—	* Evaporate F. E. Bloodroot with HCl and water to remove all the alcohol. Precipitate with ammonia and filter. Dissolve precipitate in dilute HCl and filter again. Make alkaline and extract with ether.	
Bellad. Root, .	" " § 120.	—	** A mixture of { Benzine 70 } { Ether 25 } was used instead of benzine alone.	
Bloodroot, . . . . . *		Ether alone.	† Instead of titrating with sodium phosphomolybdate solution as given in § 188 we made alkaline with potassium carbonate and extracted with benzine and evaporated in tared beaker after adding a few drops of dilute hydrochloric acid.	
Cinchona, . .	" " § 127.	Chlorof. ether.	‡ We used dilute acetic instead of sulphuric acid.	
Coca Leaves, .	" " § 154.**	" "	⊙ The chloroform ether extract was allowed to evaporate spontaneously after adding some dil. HCl. Filtered and washed with dilute HCl and extracted with ammoniated benzene-chloroform.	
Colchicum Seed	" " § 173.	" "	Proceeded as under ⊙ but extracted with chloroform ether finally, making extract slightly acid by means of decinormal hydrochloric acid and heated to 100° C. weighing as coniine hydrochloride.	
Conium Fruit,	" " § 188.†	" "	⊙⊙ Proceeded as under ⊙ using chloroform ether for final extracting—allowed this to evaporate spontaneously and when dry heated to 100° and weighed.	
Gelsemium, . .	" " § 207.	" "	Chloroform extract is evaporated at moderate heat on water-bath; dilute acetic acid is then added and some ether to insure combination of alkaloid with acid. After evaporating the ether, filter, wash, and then make alkaline with ammonia and extract with chloroform. Evaporate at moderate heat and finally at 100° C.	
Henbane, . .	" " § 120.	—	Δ Thompson's Method — see Proceedings of the Michigan State Pharmaceutical Association, 1891, p. 67.	
Ipecac, . . . .	" " § 29.	—	ΔΔ Beckurts' Method — see Pharmaceutische Rundschau, Vol. IX, p. 255 (November, 1891).	
Jaborandi, . .	" " § 120.	— ⊙⊙		
Nux Vomica, .	" " § 261.	—		
Stramon. Seed,	" " § 120.	—		
Veratr. Viride,	" " § 120.‡	—		

# THE RELATIVE ALKALOIDAL VALUE OF THE VARIOUS PARTS OF THE PLANT OF DATURA STRAMONIUM.

BY ALFRED R. L. DOHME, PH.D.

The original intention when this subject was taken up, was to extend its scope so as to embrace all of the principal narcotic herbs, viz.: hyoscyamus niger, atropa belladonna, duboisia myoporoides and datura stramonium, and to examine the drugs both in the dry and the fresh condition as to their content of alkaloids. Unfortunately this could not be carried out, as not all of the parts of each of the plants could be obtained, and many of these that did arrive from Europe in the green state had been spoiled during transit and were worthless. But little work has been done recently on this subject, and as far as the writer knows no work has been published that bears the stamp of a titration examination on it. Guenther,<sup>1</sup> in 1869, obtained the following results as the outcome of an examination of Atropa Belladonna and Datura Stramonium using only fresh, undried plants :

	Per Cent. Alkaloids Gravimetrically.
Leaves of Atropa Belladonna, . . . . .	0'2
Stems " " " . . . . .	0'042
Seed " " " . . . . .	0'335
Ripe fruit of " " . . . . .	0'21
Unripe " " " . . . . .	0'196
Roots " " " . . . . .	0'062
Leaves of Datura Stramonium, . . . . .	0'076
Stems " " " . . . . .	0'018
Seed " " " . . . . .	0'255
Roots " " " . . . . .	0'024

In the light of modern experience these results appear rather abnormal and it seems difficult to account for the very small yield of alkaloids from belladonna root and stramonium leaves, as well as the small yield from belladonna leaves as compared with the large yield from belladonna seed and stramonium seed.

Lefort attempted to discover a relation between the yield of the drug and the stage of its growth at which it was gathered. He found:

	Per Cent. Alkaloids Gravimetrically.
Belladonna Leaves, gathered in August, to contain, . . . . .	0'45
" " " May " . . . . .	0'40
" Roots, 2 to 3 years old, " . . . . .	0'475
" " 7 to 8 " " . . . . .	0'30

<sup>1</sup> Guenther—Pharmaceutische Zeitschrift für Russland, February, 1869.

These results approximate the results of to-day much nearer than those of Guenther and are probably nearer the truth. Trommsdorff could obtain only 0.002–0.02 per cent. of alkaloids from Stramonium Seed and E. Schmidt only 0.05–0.06 per cent.

Dragendorff by the application of his volumetric method<sup>1</sup> (using a vigintinormal solution of mercurio-potassium iodide<sup>2</sup>), obtained the following results:

	Per Cent. Alkaloids.
Belladonna Leaves yielded, . . . . .	0.66
“ Roots “ . . . . .	0.40
Stramonium Leaves “ . . . . .	0.612
“ Seed “ . . . . .	0.380

The writer's experience in assaying narcotic herbs has been that Dragendorff's method or any other method that employs a solution of mercurio-potassium iodide is unreliable. Some assays given below and made at various times during the course of two years by various gravimetric methods<sup>3</sup> and Dragendorff's method show this quite plainly. In case of those results opposite one another, marked with an asterisk, the same drug was used in both methods so as to enable direct comparisons to be made:

Belladonna Leaves.		Belladonna Root.	
Gravimetric method without titration.	Dragendorff's volumetric method.	Gravimetric method without titration.	Dragendorff's volumetric method.
Per cent. alkaloids.	Per cent. alkaloids.	Per cent. alkaloids.	Per cent. alkaloids.
0.40*	0.75*	0.26*	0.46*
0.38	0.64	0.54*	0.74*
0.42	0.56	0.49*	0.83*
0.34*	0.51*		
	0.81		
	0.45		

<sup>1</sup> Dragendorff's method—Manual Pharmaceutical Assaying (Lyons), § 91, p. 48.

<sup>2</sup> Mayer's solution.

<sup>3</sup> Lyons method—Manual Pharmaceutical Assaying, § 29, p. 20, and Dunstan and Ransom's method—Manual Pharmaceutical Assaying, § 112, p. 56.



Henbane Leaves.		Stramonium Leaves.	
Gravimetric method without titration.	Dragendorff's volumetric method.	Gravimetric method without titration.	Dragendorff's volumetric method.
Per cent. 0'166* 0'177 0'160	Per cent. 0'25* 0'20 0'22	Per cent. 0'42 0'36*	Per cent. 0'64 0'59*

It appears questionable whether the figures of Guenther, Lefort, etc., are absolutely reliable in face of the fact that they did not titrate their results, especially since titration with volumetric acid solution has been admitted here and in Europe to be the most reliable means of correctly assaying alkaloidal drugs. The following figures were obtained from a series of assays of the various parts of the plant *Datura Stramonium*, viz: leaves, stems, seeds and roots. The plants were gathered in the vicinity of Baltimore, where they grow wild during the months of July and August. The parts of the plants were separated while still green, some being cut up and assayed at once undried, the rest, however, were carefully dried, powdered and assayed about a week after they were gathered. The stems, roots and leaves marked "a" and "b" were all taken from the same plants, which too were gathered in July, but the seed were older and were taken from a lot whose origin was not known. The parts marked "c" were gathered in August, part being assayed in the fresh green state, part being used to determine the amount of moisture<sup>1</sup> in order to be able to compare the percentages in the dry and moist conditions directly, part finally being used for drying and being then assayed in the form of a dry fine powder. Those parts that were assayed in the green or fresh condition are marked "green" in the table below. The methods of assay used were the method of Lyons<sup>2</sup> for the determinations marked "a," and that of Dragendorff<sup>3</sup> for those marked "b" and "c." Dragendorff's method

<sup>1</sup> The percentage of moisture varies from seventy-five to eighty-five per cent.

<sup>2</sup> Lyons—Manual of Pharmaceutical Assaying (Lyons), § 29, p. 20.

<sup>3</sup> Dragendorff—Manual of Pharmaceutical Assaying (Lyons), § 91, p. 48.

was modified so as to be used as a gravimetric process and differed from Lyons merely in the use of dilute alcohol and tartaric acid in the place of Prollius' Fluid. It gave better results than Lyons. See below:

Part of plant used.				Gravimetric percentage.	Percentage by titration of former.
Leaves of <i>Datura Stramonium</i>	(a), . .			0'654	0'214
"	"	"	(b), . .	0'554	0'231
"	"	"	(c), . .	1'420	0'231
"	"	" green	(c), . .	1'420	0'271
Stems	"	"	(a), . .	0'770	0'306
"	"	"	(b), . .	1'060	0'358
"	"	"	(c), . .	0'931	0'439
"	"	" green	(c), . .	1'000	0'467
Roots	"	"	(a), . .	0'496	0'138
"	"	"	(b), . .	0'790	0'173
Seeds	"	"	(a), . .	0'556	0'248
"	"	"	(b), . .	0'596	0'289

It would seem from these figures that the stems of *Datura Stramonium* are richer in alkaloid than any other part of the plant. Next in percentage are the seed, then the leaves and finally the roots. It is also evident that some slight loss occurs during the process of drying. A similar investigation of the leaves, stems, roots and seed of the plant *Hyoscyamus Niger* has been made, the plants having been gathered in June and imported from Hungary for that purpose. The result was to show that the stems and seed contained little or no alkaloid while the roots contained 0'017 per cent., which is so small that for all practical purposes it may be regarded as none. The residue in the case of the stems and seed did not neutralize any volumetric acid solution, although there was a slight gravimetric residue, from which it is inferred there is either no alkaloid present or alkaloid which possesses no alkaline reaction. The leaves yielded 0'173 per cent. alkaloids by titration. Schoonbrodt has found that henbane leaves gathered in June yield less than those gathered at other times, and also that seeds gathered in June yield no alkaloid.

BALTIMORE, August 29, 1893.

## THE RELATION OF SPECIFIC GRAVITY TO ATOMIC WEIGHT.

By A. N. DOERSCHUK.

Read before the Missouri State Pharmaceutical Association.

Since the study of Chemistry by beginners and amateurs is so often hampered by apparently logical theories and conclusions which seem perfectly correct to the undeveloped eye, which has not been associated with the fundamental truths and underlying principles of this acute science, and, since views obtained from these theories and conclusions often cost much labor, time and many ungrounded misgivings, we ask your most worthy attention for a few moments while we explain one of these theories which so often worry the beginner in Chemistry, and for which very few if any satisfactory explanations are given.

The problem generally presents itself in this shape:

"Why is the sp. gr. of Iron (7.84), to the sp. gr. of aluminium (2.56) not proportionate to the atomic weight of iron (55.9) to the atomic weight of aluminium (27)?" Or "Why is the sp. gr. of iron to the sp. gr. of aluminium not proportionate to the molecular weight of iron to the molecular weight of aluminium?" Or "Why is it that the sp. gr. of a body, in a proportion to the sp. gr. of water, or (1), is not the same as the proportion formed by the molecular weight of that body and the molecular weight of water or (18)?" To get a clear idea of this matter, we must first know that the sp. gr. of a body is a "purely nominal value" and is "the relative weight of equal bulks of different bodies." From observation we know that a material difference exists in the "bulk or volume" of the same weights of different bodies, while the molecular weights of these bodies are nearly the same; therefore, density is as great a factor in determining the sp. gr. of a body, as is the intrinsic value of the element or elements contained in that body compared to a standard of weight. Physical research has taught that molecules are never in absolute contact; in fact, the density of a substance is entirely dependent upon molecular affinity and the pressure and heat to which it is subjected. Let us take, for instance, a body the sp. gr. of which is .5, sp. volume 2, and its bulk twice as great as that of an equal weight of water. Now, if in the space between the molecules of this body we would place the same number of molecules of the same construction as are in the body, then its sp. gr.

would be increased to 1, and its sp. volume reduced to 1; and if from the same body we would take one-half of the molecules and leave the remaining half to fill the same space as was occupied by the original body, then its sp. gr. would be reduced to .25 and its sp. volume increased to 4. So we see that specific gravity is purely a mutable signification, entirely dependent upon the intrinsic value of matter compared to a standard of weight, and upon density which is regulated by molecular affinity, gravity, atmospheric pressure and heat.

It is clear that a proportion of the atomic weights of two different bodies could not be in ratio with the sp. gravities of these bodies, because atoms of different elements unite in different numbers to form molecules, and the atomic weights of different elements are taken at different temperatures, while sp. gr. is always taken at the same temperature.

The impossibility of the molecular proportion is due to the fact that molecular weight is a constant quantity, being derived with all the elements from the same basis and under *similar* conditions, while specific gravity is a variable quantity, being derived with all the elements under *different* conditions, upon the same basis, and, as the same thing differently treated, does not yield the same result, so the specific gravity and molecular or atomic weight of the same substance, differently derived, cannot be expected to be proportionate in any way.

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## THE CHEMISTRY OF IPECACUANHA.<sup>1</sup>

DR. B. H. PAUL AND A. J. COWNLEY.

Next to opium and cinchona bark, ipecacuanha is probably one of the most important drugs included in the official materia medica, but its chemical history is still very imperfect, and although some of its medicinal effects are ascribed to an alkaloid, there is considerable doubt whether that is always the case.

For several months past we have been engaged in the endeavor to devise a satisfactory method of extracting from ipecacuanha the alkaloid which has been regarded as the active principle of this drug, and to which the name of emetine has been applied; our object being to obtain such means of quantitative determination as

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<sup>1</sup> From Pharm. Jour. Trans., July 22, 1893, p. 61.



could be relied upon when applied to the examination of different samples of the commercial drug or of its medicinal preparations. In prosecuting this inquiry reference has, of course, been made to the observations of previous experimenters; but instead of deriving much assistance from the published statements of their results, we have found that they lead to considerable uncertainty respecting the chemical identity of the substance. Thus, for instance, in the description of emetine given by Lefort,<sup>1</sup> it is stated to be very readily soluble in solutions of caustic soda or potash, and that in such solutions emetine rapidly undergoes alteration by absorbing oxygen from the atmosphere. We have found that this is not the case with the alkaloid supplied by Merck as pure emetine, or with that which we have ourselves obtained from *ipecacuanha*. Even on precipitating the base from solutions of its salts with caustic alkalies the precipitate formed is not dissolved again on adding an excess of caustic alkali. There are similar discrepancies between the statements as to the physical characters of the alkaloid of *ipecacuanha*. Most authorities describe it as being perfectly amorphous, some state that it is susceptible of crystallization, under certain conditions, while others again describe it, without any qualification, as having the form of "needles"<sup>2</sup> or "crystals."<sup>3</sup> The statements as to the melting point of the alkaloid also differ considerably. In addition to these discordant statements, we have found, in experimenting with several samples of *ipecacuanha*, that the alkaloid is not homogeneous, but a mixture of two or more different substances.

Under these circumstances it appeared to be premature to attempt the determination of emetine, as a means of ascertaining the relative value of samples of *ipecacuanha* or of its medicinal preparations, and we have therefore directed our attention to the general chemical examination of the alkaloid constituents of the drug, as a necessary preliminary to the endeavor to devise some practically applicable method of valuation. This inquiry is not yet sufficiently advanced for the publication of the results as a whole; but some points which have been made out, are of sufficient interest to be worth mention in anticipation of a more complete account.

From the examination of a number of different samples of *ipecac-*

<sup>1</sup> Am. Journ. Pharm., 1869, 307.

<sup>2</sup> Watts' "Dictionary," ii, 431.

<sup>3</sup> Thorpe's "Dictionary," iii, 916.

cuanha we have ascertained that the alkaloid existing in this drug is for the most part a perfectly amorphous substance, of marked alkalinity, forming definite neutral salts which are also amorphous, and, like the base they contain, uncrystallizable by any means we have been able to apply. Hence it would appear that the want of a simple method of obtaining crystallized emetine is likely to remain a constant quantity, and that, in point of fact, the determination of emetine is at the present time only approximately possible, inasmuch as the substance is unknown.

Further, we have found that this amorphous alkaloid is associated with others which are distinctly crystalline and very different from the amorphous alkaloid in physical characters. This fact we have established beyond doubt, and we are of opinion that it will serve to account for some of the discordant statements which have been made in regard to the alkaloid of *ipecacuanha*. Thus, for instance, it is stated by Kunz,<sup>1</sup> as well as Lefort and Wurtz,<sup>2</sup> and Podwisotszki,<sup>3</sup> that although the substance described by them as emetine was generally amorphous, they sometimes obtained the alkaloid in the form of distinctly crystalline needles, by rapid evaporation of an ether solution. On several occasions we have observed a similar formation of very delicate silky crystals when the ether solution of the alkaloid from *ipecacuanha* was left for some time. Sometimes the formation of these crystals took place in such a manner that the ether solution appeared to become quite solid; but on recrystallization from ether the apparently solid mass could be separated into an amorphous portion and a crystalline substance that was much less soluble and, in proportion as it was purified, was found to have a melting point of 90° to 98° C., which is very much higher than that given for emetine by any observer. Consequently the desideratum of crystallization, assumed to be necessary for the determination of emetine, would not, if it were attainable, suffice for that purpose, since other alkaloids are present which would still have to be separated in order to obtain definite results.

The crystalline alkaloid above referred to is very much less soluble in ether, chloroform, or benzine than the amorphous alkaloid with which it is associated; but, as is usual in such cases, it is

<sup>1</sup> Archiv der Pharmacie [3], xxv, 465.

<sup>2</sup> Am. Jour. Pharm., 1877, 460.

<sup>3</sup> Am. Jour. Pharm., 1880, p. 206.

not until separation has been carried to some considerable extent that this difference becomes apparent. The quantity of material disposed of in the operations of fractional crystallization or precipitation, requisite for separating the alkaloids, is so great that very little remains for further examination unless larger quantities are operated with than we have yet had at our disposal.

The stem of Brazilian *ipecacuanha* appears to contain a small amount of the same amorphous alkaloid that is present in the root; but it is accompanied by a distinctly crystalline alkaloid. It is very sparingly soluble in ether, but separates from the solution on slow evaporation in lemon-yellow transparent crystals melting above 100° C. When precipitated from the solution of a salt by ammonia, it rapidly assumes a crystalline form, and on addition of caustic soda it is dissolved in the manner stated by Lefort (see *supra*). It forms a neutral hydrochloride which is amorphous, and the platinum salt appears to be readily decomposed.

This alkaloid is present in very much larger proportion, relatively to the amorphous alkaloid, than it is in the root. Consequently it follows that determinations of the amount of alkaloid, as a whole, in the stem will not correctly express the relations of stem and root in regard to the amount of emetine. Evidently no inference can be drawn from such determinations as to the relative values of those portions of the plant as medicinal agents. Before that can be done with any degree of certainty it will be necessary to find means of separating the alkaloids so that their several amounts may be ascertained, and to do that a knowledge of their characters must be obtained. With that object in view we are now engaged in preparing such quantities of the several alkaloids of *ipecacuanha* as will admit of their chemical characters being studied, so as to furnish data for their separation and identification, besides furnishing material for ascertaining their respective therapeutic effects. Meanwhile, however, it must be pointed out that, apart from the absence of official recognition, there is no ground whatever for the assumption that *ipecacuanha* stems possess properties which justify the admixture with the roots. So far as anything is known it points in the opposite direction.

Another point to which attention is being directed is the question as to the relative value of other kinds of *ipecacuanha*, such as, for instance, that of New Granada, which is said to be probably derived



from a plant different from that which yields Brazilian *ipecacuanha*. This Carthagena root is stated to be equal to, if not better than, the Brazilian at the present time.<sup>1</sup> That opinion is based upon the amount of alkaloid that has been obtained from the Carthagena *ipecacuanha*, and in regard to that point we have found that there is little or no difference between the two kinds. It has been assumed that the alkaloid present in this root is the same as that contained in Brazilian *ipecacuanha*. There is no distinct chemical evidence that such is the case; but in the course of our experiments relating to this subject we have at least obtained evidence that Carthagena *ipecacuanha* contains, in addition to a considerable amount of amorphous alkaloid, some proportion of another crystallizable alkaloid, which presents marked differences from the crystalline alkaloid of Brazilian *ipecacuanha*. Until the investigation of this material, in regard to the chemistry of its constituents and the therapeutic effects they produce, has been thoroughly carried out, and it shall have been shown that they are identical with those of the Brazilian drug, it would, however, be unjustifiable to advocate the substitution of the one for the other upon the ground of possible similarity of origin or of apparently analogous medicinal characters.

Before concluding it may be useful to refer to some of the opinions which have been expressed in regard to the striking absence of agreement between the data obtained in determinations of the alkaloid in *ipecacuanha*. Upon the basis of those data very dissimilar opinions have been expressed as to the amount of emetine in the drug. While some have taken one per cent. as the maximum others have taken 1.6 as the minimum for a sample of good quality, and others again have insisted that nothing should be recognized as good which does not contain at least 2.5 per cent. Placing side by side with these differences the different experimental data obtained by various operators, which run through all possible gradations between one and upwards of three per cent., it is evident either that *ipecacuanha* root is a very variable drug, or that the experimental results must have been largely influenced by accidental circumstances. The methods adopted by different operators are generally supposed to be chiefly accountable for the differences in the results obtained, and the facts we have already

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<sup>1</sup> *Ph. J.* [3], xxiii, 267, and Keller, *Ph. J.* [3], xxiii, 592.



established as to the existence of distinct alkaloids, in regard to which some solvents exercise a differentiating action, will perhaps help to account for some of the differences between experimental results previously obtained.

There are, however, other conditions the probable influence of which upon the analytical results may be traced. It has been assumed that emetine is destroyed by the action of heat, and hence the recommendation of the cold extraction and evaporation at low temperatures. We have not found either of these precautions to be essential or of importance. The solvents used for extraction or to be evaporated in concentrating solutions, generally resemble ether in being of such a nature that no excessive heating need be feared in either of those operations. It is rather in the operation of "shaking out" that loss of alkaloid is likely to be caused, not by its destruction, but as a consequence of particles of the precipitated alkaloid being melted and thus rendered practically insoluble. The fact that the alkaloid becomes almost insoluble after being melted has been pointed out by Kunz, and as its melting point is so low there is great risk of loss in this way if the precipitation is too rapidly carried out. The assumed decomposing action of alkalies has been spoken of as causing low results; but that explanation is inconsistent with the fact, mentioned by Kunz, that emetine offers remarkable resistance to the action of alkalies. Altogether we are disposed to think that in the determination of alkaloid in *ipecacuanha* differences in experimental results are not due to the nature of the solvent employed for extraction or to the method of operating. It seems much more probable that such differences arise from the want of preserving, throughout the entire treatment, conditions which are suited to the characters of the material operated upon and of the substance to be obtained from it. This appears to be of much greater importance than strict adherence to a mere rule of thumb procedure.

No.	Total Mixed Alkaloids.	
	Root.	Stem.
1, . . . . .	2'02	—
2, . . . . .	1'95	—
3, . . . . .	2'14	—
4, picked, . . . . .	2'12	—
5, " . . . . .	—	0'97
6, . . . . .	2'08	—
7, . . . . .	2'03	—

No.	Total Mixed Alkaloids.	
	Root.	Stem.
8, picked, . . . . .	2'28	—
9, " . . . . .	—	1'76
10, . . . . .	2'22	—
11, picked, . . . . .	—	1'02
Mean, . . . . .	2'11	1'25

So far as we are in a position to form an opinion on the point above referred to, from the analytical examination of a comparatively small number of samples of ipecacuanha, we are inclined to the conclusion that the percentage amount of alkaloid in ipecacuanha root does not vary very much from 2 per cent., as shown by the results given in the foregoing table.

The picked samples consisted entirely of either root or stem respectively. The other samples of root were operated upon without separating any admixture of stem that might be present; but it was not in any case sufficient to affect the result very materially. Two of the samples of stem were carefully picked to separate any particles of root; but the other sample, No. 9, was found, after the analysis had been completed, to contain a considerable admixture of portions of root bark, and that circumstance probably accounts for the higher amount of alkaloid obtained in that instance.

## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

*Benzoin-alumina cotton* a substitute for the ferric chloride cotton, is recommended by Giulio Morpurgo as a hæmostatic preparation, because it is efficient and at the same time does not stain the containers. It is made by boiling the solution of aluminum acetate with benzoin, straining, and at once impregnating the cotton. The prepared cotton is white and has a very pleasant odor; a considerable quantity of finely divided benzoin is separated upon the fibres, assisting by a mechanical action the astringent properties of the alumina.—*Pharm. Post*, 1893, 357.

*Test for sugar in urine.*—Several years ago Ihl observed that methylene blue in aqueous alkaline solution was decolorized by a number of carbohydrates, including dextrose, lævulose, lactose, invert sugar, dextrin, etc.; Herzfeld and Wohl later determined

invert sugar in cane sugar by this test. Dr. N. Wender, studying the test to ascertain its applicability to the examination of urine, found that a number of urine constituents were capable of decolorizing strongly alkaline methylene blue solutions. By proper dilution of the urine this source of error was remedied, and the test then is of sufficient accuracy to warrant its recommendation. 5–10 cc. urine are diluted with nine volumes of distilled water; 1 cc. of the diluted urine, 1 cc. of an aqueous methylene blue solution (this solution is permanent and contains one gram pure color in a liter), 1 cc. normal potassium hydrate solution and 2 cc. distilled water are heated and retained at the boiling point for about one minute; if the original urine contained 0.5 per cent. or more of dextrose the blue color will be discharged, otherwise the urine should not be pronounced diabetic. The decolorized test upon cooling separates methylene white, and by exposure to air this gradually absorbs oxygen and reproduces the blue color. From quantitative experiments made with glucose, it was determined that to decolorize one molecule methylene blue one molecule of dextrose was required, so that one milligram of pure color (equivalent to 1 cc. of the solution), requires 0.5 milligram of dextrose. A number of experiments with normal urine established that one mg. methylene blue was decolorized by about 4.5 cc. of the diluted urine (1 + 9) indicating in normal urine a quantity of reducing substances equivalent to 0.11 per cent. dextrose. After ascertaining that the urine is diabetic, it is possible to approximately estimate the dextrose by diluting with 49, 99 or 199 volumes of water, accordingly as the specific gravity is found in one of the three groups, 1.017–1.025, 1.025–1.030, 1.030–1.038; by a series of trials is next determined the exact quantity of the diluted urine necessary to decolorize one cc. of the methylene blue solution; the formula  $\frac{0.05 v}{c}$  ( $v$  representing the dilution of the urine 50, 100 or 200, and  $c$  the number of cc. of the diluted urine necessary for decolorization), gives at once the percentage of dextrose in the original urine.—*Pharm. Post*, 1893, 393–397.

*Lanolin*.—E. Dieterich, in the *Helfenberger Annalen*, 1893 (through *Pharm. Post*, 1893, 426), publishes the observation that lanolin is capable of becoming rancid; a decolorized and purified sample in 1886 had the acidity figure of 0.84; after six and a half years' keep-

ing in a cork-stoppered salt mouthed bottle, it had become decidedly rancid, with the acidity figure 17.36; the cork was bleached and quite soft.

*Oleo-creasote*, the ester of oleic acid and creasote is a yellow, oily liquid, having a faint odor of creasote but free from the caustic taste of creasote; it is insoluble in water, alcohol and glycerin, but easily soluble in absolute alcohol and ether. Being a neutral body, daily doses of 10–15 grams can be administered without interfering with the functions of the stomach. It can be made by allowing 74.4 gm. pure creasote and 109.2 gm. pure oleic acid to stand for several hours before heating in an oil-bath to 135° C. for 1½ hours; the product is then repeatedly washed with distilled water, next with a dilute soda solution and lastly again with distilled water; to remove the last traces of water it is agitated with anhydrous sodium sulphate. The yield is rather unsatisfactory, as only about fifty per cent. of the theoretical quantity is obtained.—C. Levy, *Journ. der Pharm. v. Els.-Lothr.*, 1893, 249.

*Easily soluble quinine double-salts*, according to an application for a German patent, can be made by either dissolving quinine sulphate in diluted hydrochloric acid and evaporating in vacuo, or by passing hydrochloric acid gas over quinine sulphate previously dried at 100° C., displacing the excess of acid vapors by a current of air and finally drying in vacuo in the presence of potash. The salt has the formula,  $(C_{20}H_{24}N_2O_2)_2 \cdot 2 HCl \cdot H_2SO_4 + 3 H_2O$ . It crystallizes in needle-shaped masses, loses its water of crystallization between 100° and 108°, is very easily soluble, the anhydrous salt dissolving in an equal weight of cold water. Instead of quinine sulphate the alkaloid with the proper quantities of hydrochloric and sulphuric acids may be used. The corresponding double salt containing hydrobromate with sulphate has an analogous formula but is not so soluble, the anhydrous salt dissolving in about three parts of water.—*Südd. Apoth. Ztg.*, 1893, 339.

*The banana fruit* contains cane sugar as the chief carbohydrate, *invertase* is also present, explaining the various proportions of cane sugar and invert sugar existing in infusions made at different temperatures. At 54–57° C. a five hours' digestion will not only completely invert the saccharose existing in the fruit but considerable additional quantities.—D. F. Mieran, *Chemiker Ztg.*, 1893, 1021.



*Estimation of phosphorus* in medicinal preparations. The phosphorus is extracted from the remedy by triturating in a mortar with carbon disulphide (which itself must not show any color when agitated with silver nitrate solution); the extraction is continued with fresh portions of the solvent until the filtrate gives only a faint brown coloration with silver nitrate. The carbon disulphide solution (containing 20–40 mg. phosphorus) is then agitated with 10 cc. of a five per cent. silver nitrate solution, and 10 cc. water until the maximum intensity of color due to the formation of silver phosphide is reached; 20 cc. dilute nitric acid are next added, the mixture thoroughly agitated, the carbon disulphide distilled off and the phosphoric acid precipitated by ammonium molybdate and converted into magnesium pyrophosphate.—Julius Toth, *Chemiker Ztg.*, 1893, 1244.

*Sodium fluoride* used as a preservative of foods is apparently not the harmless agent that it is claimed to be; some fish kept in a 2½ per cent. solution of sodium fluoride at 16–35° C., showed signs of decomposition at the end of two weeks; a 5 per cent. solution kept the fish in good appearance for six months. To test the question as to the physiological effect of such preserved food a portion of baked fish was eaten, the flow of saliva was notably increased at once, followed a little later by vomiting and purging, these symptoms of poisoning disappearing during 48 hours. The quantity of sodium fluoride taken in this case was estimated at 5.5 grams; one gram taken by a grown person during a meal was followed by salivation, headache and nausea. These signs of impaired digestion continued for over 48 hours.—A. G. Bloxam, *Chemiker Ztg.*, 1893, 1244.

*Starch and dextrin*, dry or in solution, are bleached and deodorized by simultaneous treating with chlorine and ozone, either as gases or in solutions. From the patent claim these two bleaching agents perfect each other in the bleaching of the coloring matters in the above substances. The bleached dextrin is odorless and tasteless and is used as a substitute for gum arabic.—*Chemiker Ztg.*, 1893, 1289.

*Salacetol*, the ester of salicylic acid and acetylcarbinol, is a synthetic product intended to replace sodium salicylate and salol, especially the latter because of the fear of poisoning by carbolic

acid which is liberated when salol is taken into the system. Salacetol,  $C_6H_4(OH)COOCH_2COCH_3$ , is made by heating monochloracetone  $CH_2ClCOCH_3$  with sodium salicylate; it crystallizes from alcohol in fine lustrous needles, from benzin in scales; it dissolves only slightly in cold water and cold alcohol; it is more soluble in these solvents when hot; it is easily soluble in ether, carbondisulphide, chloroform, benzole, benzin, etc. It has a slightly bitter taste and melts at  $71^\circ C$ . The aqueous solution gives a violet color with ferric chloride; agitation with dilute solution of sodium hydrate (0.6 per cent.) saponifies it, yielding a clear solution which upon acidifying with hydrochloric acid separates approximately seventy-five per cent. salicylic acid. The dose for an adult is 2.0–3.0 gm., which administered with 30.0 castor oil has been found very successful in the treatment of diarrhœa; the dose is taken before breakfast and can be repeated for several days; 0.5 gm. is a harmless daily dose for a child one year old.—*Pharm. Ztg.*, 1893, 496.

*The presence of indican* in plants can be ascertained by boiling a few fragments of the plant in a test tube for about one-half minute with a dilute solution of ammonia made by diluting the official ammonia water with 49 volumes of water; after filtering and cooling the decoction is agitated with chloroform. The same operation substituting two per cent. hydrochloric acid for the diluted ammonia is made with another portion of the plant; if indican be present the chloroform layer of one or of both of these tests will be colored blue or violet. The fact that the indican of some plants is decomposed by ammonia, while in others it is not, indicates that the indican of all plants may not be identical.

The recurring statements that the following plants contain indican is declared to be erroneous: *Mercurialis perennis*, *Melampyrum arvense*, *Polygonum Fagopyrum*, *Phytolacca decandra*, *Monotropa Hypopitys*, *Fraxinus excelsior*, *Coronilla Emerus* and *Amorpha fruticosa*.

*A chromogene*, yielding with dilute hydrochloric a blue coloring principle which differs entirely from indigo, was found in *Lathræa Squamaria*; probably the same chromogene is present in *Rhinanthus crista galli*, *Melampyrum nemorosum*, *M. silvaticum*, *Bartsia alpina*, *Euphrasia officinalis*, *Utricularia vulgaris*, *Galium Mullugo* and *Monotropa Hypopitys*.—Prof. Hans Molisch, *Oesterr. Ztschr. f. Pharm.*, 1893, 523.

*The detection of iodic acid in nitric acid* may be speedily accomplished by the following tests: (1) 10 cc. of 30 per cent. nitric acid and a few pieces of tin are slightly warmed, allowed to stand for one minute and agitated with chloroform. (2) 5 cc. nitric acid and 0.1 gm. sodium or calcium hypophosphite are allowed to stand for several minutes before agitating with chloroform. Iodic acid is indicated in both tests by the violet coloration of the chloroform due to liberated iodine.—Pieszcsek and Looff, *Apoth. Ztg.*, 1893, 322 and 335.

*A sample of linseed oil* which caused symptoms of poisoning was found to have been obtained from seed containing about 35 per cent. impurities, the chief one present to the extent of 15 per cent. was the seed of *Lolium temulentum* or more exactly *L. remotum*.—Pieszcsek, *Apotheker Ztg.*, 1893, 335.

*Vasogen or vaselinum oxygenatum*, a name given to mineral oils which are impregnated in a secret manner with oxygen; they are capable of emulsifying with water, and will dissolve many remedial agents like iodoform, creasote, ichthyol, menthol, pyrogallol, camphor, pyoktanin, etc., causing their ready absorption; by heat the oils lose the emulsifying properties. The solution of creasote in vasogen taken in milk is stated to be preferred by the patients to any other mode of creasote administration.—Dr. M. Dahmen, *Pharm. Ztg.*, 1893, 510.

*Benzoin*.—The investigations published in the Am. Journ. of Pharm., 1893, 224 and 459, are supplemented by the following additional results: The purified esters separated from Sumatra benzoin were found by saponification to contain 32.9 per cent. cinnamic acid; the mixture of alcohols combined with the salicylic acid was made up of 5.2 per cent. benzoeresinol and 64.5 per cent. resinotannol. From these figures the proportions of esters would be benzoeresinol cinnamate 7.4 per cent. resinotannolcinnamate 92.6 per cent. Attention is called to Sumatra benzoin as a source of cinnamic acid, allowing 15 per cent. woody impurities and several per cent. for benzoic acid at least 75 per cent. of the benzoin consist of cinnamates yielding 20–24 per cent. cinnamic acid; the remaining resinotannol, 50–60 per cent. can be easily converted into picric acid by warm concentrated nitric acid; the vanillin present to the extent of 0.1 per cent. can also be profitably extracted. The method suggested



for the preparation of cinnamic acid is as follows: The filtered ethereal solution of benzoin is agitated with a dilute solution of soda to remove the free benzoic acid and vanillin; the ether is distilled off and the pure esters saponified by boiling with solution of soda for several hours; after acidifying, the mixture is boiled and filtered, the filtrate upon cooling separating the acid which is purified by recrystallization, the resinous mass upon the filter is saponified as often as necessary to ensure complete decomposition of the esters (until the alkaline solution warmed with potassium permanganate ceases to develop the bitter almond odor).

The extraction of benzoic acid from Siam benzoin is effected by repeatedly boiling the benzoin for several hours with fresh portions of solution of soda (this must not be too concentrated) until the resin loses the gummy nature and becomes brittle and pulverulent by acidifying the boiling liquid, filtering and cooling the crude, benzoic acid is obtained and then purified by recrystallization and the acid of animal charcoal. This method is superior to the older one, in which milk of lime is used for saponifying, because of the greater yield and the rapidity of the process. Two specimens of *Palembang benzoin* contained benzoic, but no cinnamic acid; this is remarkable since this variety of benzoin comes from Sumatra. The price of this benzoin is very low and the manufacture of benzoic acid from it therefore suggests itself. Three specimens of *Penang benzoin* gave varying results: one contained benzoic acid with a very small quantity of cinnamic acid; in the second only cinnamic acid was present, while the third contained chiefly cinnamic acid with smaller quantity of benzoic acid.—F. Lüdy, *Arch. der Pharm.*, 1893, 500–513.

## ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*Estimation of Camphor.*—M. Manseau gives, in *Bull. de pharm. de Bord.*, July, 1893, p. 222, several processes for the estimation of camphor, taking as a basis for them the following experiments: Place 1 or 2 gm of camphor, purified by several crystallizations from alcohol, on a small funnel, below which a tared platinum capsule is attached, and add 10 cc. of 65 per cent. ether, for dissolving the camphor and washing the funnel. Evaporate the ether, and place on a sensitive balance, although the camphor is still moist; if now



the precaution is taken to remove the camphor two or three times carefully from the sides of the capsule into the bottom, the exact weight of the camphor will be found again after standing about thirty-five minutes.

*Estimation of camphor in camphorated alcohol.*—Place 20 gm. of the camphorated alcohol into a flask of 150 cc. capacity and add about 100 gm. of water: the camphor precipitates; add 10 cc. of 65 per cent. ether and agitate; after several minutes decant the lower layer of the liquid by means of a siphon, place the last 50 cc. into a bromine tube, decant the ethereal layer, evaporate in the tared platinum capsule, and take the weight of the camphor thirty-five minutes after the visible evaporation of the ether.

*Estimation of camphor in celluloid.*—Dissolve 2 or 3 gm. of celluloid shavings in a mixture of 10 gm. strong alcohol and 35 gm. 65 per cent. ether—with constant agitation, complete solution will be effected in fifteen minutes. Add a large excess of water, when the nitrocellulose and the camphor will be precipitated separately; add 10 cc. ether and agitate; the gun-cotton powder will form a separating layer between the dissolved camphor and the supernatant ether. Filter through paper previously moistened with ether, place the filtered liquid in a bromine tube to remove the water which may have passed. Decant the ether carefully and finish the operation as in the above process.

*Estimation of camphor in camphorated oil or ointment.*—In this process it is necessary to first distil (about 200 cc.) the fatty body in a current of steam which carries over all of the camphor as well as some fatty acids. Saponify the fatty acids by the addition of several cc. of solution of caustic soda, and submit the whole to distillation. When 150 cc. have passed over, treat the resulting liquid with 10 cc. ether, decant the camphorated ether and proceed as in the other processes.

*Assay of iodoform gauze.*—Fr. Gay (*Rep. de pharm.*, July, 1893, p. 298) gives the following process: The gauze is rolled up and placed in a bath of 90 per cent. alcohol, in a Soxhlet percolator, connected with a reflux condenser and attached to a flask, into which an alcoholic solution of caustic potassa is introduced. If a ten per cent. gauze is operated upon the strength of the solution should be 5 gm. potassa to 100 cc. alcohol. The apparatus is placed

on a water bath and heated until the gauze and the alcohol are entirely decolorized. The alcoholic liquids are united and diluted with water to 250 cc., filtered, and 10 cc. of the product are neutralized with acetic acid and estimated with normal silver nitrate solution. The process can also be applied to the direct estimation of iodoform.

*Scilla maritima*.—In extracting the principle, which S. Wani-zewski names *scillinine*, of the composition  $C_{12}H_{10}O_{10}$ , which Riche Rémont called scilline (see AMER. JOUR. PHARM., 1880, p. 550), the author obtained a principle of complex composition, which he purified by washing first with water then with chloroform. In each of these liquids he found a new body soluble in alcohol like scillinine; the principle soluble in water he named *scillapicrine*, that extracted from the chloroform washing *scillamarine*. He mentions also the existence of a fourth principle, which is insoluble in alcohol and in dilute alcohol, very soluble in water, very bitter and difficultly isolated.—*L'Union pharm.; Jour. de pharm. d'Anvers*, July, 1893, p. 252.

*Helianthenin* is the name applied by Ch. Tanret to a new principle which he isolated from Jerusalem artichoke (*Helianthus tuberosus*). It crystallizes in fine microscopic needles, is soluble in its own weight of cold water, very soluble in dilute alcohol; but the solubility decreases rapidly with increase of the alcoholic titre; fuses at  $176^{\circ}$ ; its aqueous solution shows the rotation  $\alpha_D = -23.5^{\circ}$ , and the formula is  $12 (C_{12}H_{10}O_{10}) \cdot 3 H_2O_2$ . Helianthemine does not reduce Fehling's solution and is not precipitated from its aqueous solution either by baryta or by subacetate of lead.

*Synanthrin*, which was also separated from Jerusalem artichoke, is a white amorphous, nearly insipid substance. It is soluble in all proportions of water and dilute alcohol, less soluble in concentrated alcohol. It fuses at  $170^{\circ}$ , and shows the rotation  $\alpha_D = -17^{\circ}$ ; its composition corresponds to the formula  $8 (C_{12}H_{10}O_{10}) H_2O_2$ . It does not reduce Fehling's solution, and has the peculiar property of preventing the formation of saccharate of baryta from cane-sugar and boiling baryta, unless the proportion of sugar present is greater than 1.5 to 1 part of synanthrin.—*Jour. de pharm. et de chim.*, August, 1893, p. 107.

*Asaprol*, a soluble derivative of  $\beta$ -naphthol has been reported upon by Dujardin-Beaumetz and Stackler (*Bull. gén. de théér.*, July 30 and

Aug. 8 and 15, 1893). The authors state that asaprol is the sulphuric ether of  $\beta$ -naphthol in the state of the calcium salt. It is extremely soluble and in antiseptic power nearly equal to sodium salicylate, than which it is better tolerated, although an intravenous injection of a solution of asaprol is more poisonous than a similar administration of sodium salicylate solution. The adult dose is usually about 6 gm., preferably in solution, and acts as an antithermic and analgesic. It is rapidly eliminated in the urine, a test for its presence in which is the appearance of a black coloration approaching blue, upon addition of a few drops of perchloride of iron.

*Steresol* is the name given by Mr. Berlioz to a new preparation, which he reported to the *Académie de Médecine* (*Rép. de pharm.*, July, 1893, p. 362), and which is applicable for antiseptics of the mucous membranes and the skin. The formula is: purified shellac, 270 gm.; purified benzoin, 10 gm.; balsam tolu, 10 gm.; crystallized carbolic acid, 100 gm.; Chinese oil of cinnamon, 6 gm.; saccharin 6 gm.; and alcohol sufficient to make one liter.

*Methylene blue*.—Dr. C. Ferreira (*Bull. gén. de thérap.*, June, 1893, p. 488) cites a large number of cases of malarial fevers, which were treated successfully by methylene blue, and states that it is tolerated without the slightest inconvenience even by young children to whom it is administered in doses varying according to age, and that it has a manifest action on the malarial germs, causing the disappearance of the characteristic stigmata and especially of the enlargement of the liver and the spleen.

Dabrowski (*Gaz. lek.*, 1893, through *Nouv. rem.*, June, 1893, p. 274) also testifies to the antimalarial action of the methylene blue, and that it has been well tolerated in all cases, but one, which have come to his notice. He considers that the favorable action is due not to its direct influence on the germs, but to its so modifying the constitution of the blood, as to render the multiplication of the micro-organisms impossible.

*Calcium phosphate*.—In the course of an article discussing the therapy and pharmacology of the calcium phosphates, P. Carles arrives at the conclusion that the normal or tribasic phosphate only should be employed. In the hydrated form, it is most easily assimilable, being most soluble in the gastric humors. It is best prepared from pulverized animal charcoal, and if it is precipitated



from at least two hundred times its weight of water by sodium carbonate it is easily held in suspension in syrup, its properties being thus preserved indefinitely.—*Bull. de pharm. de Bord.*, July, 1893, p. 207.

*Citrate of caffeine*, according to M. Soucheire (*Rep. de Pharm.*), does not exist in aqueous solution. He prepared the salt by dissolving 1.80 gm. caffeine in 30 cc. pure chloroform, and 1.80 gm. citric acid in 15 cc. absolute alcohol, mixing the two solutions and evaporating on a water-bath; the product was a white crystalline powder, *insoluble* in chloroform, but soluble in two parts of chloroform and one part alcohol. The solution of the salt in water was evaporated on a water-bath, and the residue treated with chloroform, which took up caffeine and left citric acid as a residue, proving that the water had split up the caffeine citrate into a simple mixture of caffeine and citric acid.

*Effervescent ferric lactate*.—Cesaris gives the following formula in *Boll. farm.*: Ferric lactate 20 parts, citric acid 40 parts, bicarbonate of soda 80 parts, and white sugar 30 parts. The pulverized substances are mixed, and submitted to the heat of a water-bath in a porcelain capsule; then agitated constantly until a granular mass is obtained.—*Jour. de pharm. d'Anvers*, August, 1893, p. 309.

*Kelene* is a new name for ethyl chloride, which renders efficacious service in minor surgery.—*Jour. de pharm. d'Anvers*, July, 1893, p. 260.

*Sensitive tincture of litmus* is prepared according to *Boll. chim. farm.*, 1893, p. 298 (through *Rép. de pharm.*, July, 1893, p. 319) by exhausting the litmus with hot distilled water, evaporating the filtered solution, saturating with acetic acid, and again evaporating to thick extract consistence. This is now placed in a flask and 90 per cent. alcohol added. The blue coloring matter is precipitated, while the red substance and the acetic acid remain in solution. Filter; wash with alcohol; dissolve the coloring matter in hot water and again filter. The tincture should be preserved in flasks stoppered with cotton.

*The filtration of pepsin solutions* is facilitated by the addition of sugar of milk, which exerts merely a mechanical action and causes the liquid to remain limpid.—Wearn, in *Gior. di farm. et di chim.*, June, 1893, through *Rép. pharm.*, July, 1893, p. 320.

*Concentrated solution of salicylic acid* is prepared by M. Jaudon



(*Rép. de pharm.*, August, 1893, p. 341) by the following process by which he obtains a solution more concentrated than can be prepared by using simply water as a solvent. He dissolves 8 gm. of salicylic acid in 24 gm. of 90 per cent. alcohol; also 4 gm. of sodium borate in 8 gm. neutral glycerin, mixes the two solutions and makes up to 100 gm. by distilled water.

*Trisulphide of arsenic*, according to D. Vitali (*Boll. chim.-farm.*, through *Rép. de pharm.*, August, 1893, p. 363), is absorbed by the organism in small doses, and is transformed into arsenious acid, which is eliminated by the urine. Sulphide of arsenic, deprived of arsenic acid, has no direct influence on the organism, but favors the action of small doses of this acid.

*The elimination of various medicaments* after rectal injection, is reported upon by Kandidoff in a preliminary communication (*Vratch*, 1893, p. 353; *nouv. rem.*, August, 1893, p. 350), in which he arrives at the conclusion, that quinine hydrochlorate, potassium iodide, potassium bromide, sodium salicylate, arsenic and antipyrine are all eliminated by the mucous membrane of the stomach, and that this elimination, in the case of all, excepting the quinine, commences almost as soon as the elimination by the urine, and that tannin is passed neither in the stomachal contents nor in the urine.

*Separation of iodine.*—The following gargle was recently prescribed (*Four. de Pharm.* d'Anvers, June, 1893, p. 212): Iodine, 25 cgm.; potassium iodine, 1 gm.; tannin, 2 gm.; potassium bromide, 10 gm.; distilled water, 50 gm.; glycerin, 50 gm.; oil of peppermint, 20 drops. In dispensing this, if the four solid substances are pulverized and mixed, then dissolved in the glycerine and water, a product is obtained in which the iodine has completely separated. This inconvenience can be avoided by mixing intimately the iodine, the iodide and the tannin, dissolving the mixture in the distilled water, which will require at least two hours, then adding successively the bromide, the glycerin and finally the oil of peppermint. By this procedure a perfectly limpid brown liquid is obtained.

*Infant powders.*—A writer in *gior. di farm. et di chim.*, 1893, p. 302 (through *Rép. de Pharm.*, August, 1893, p. 364), gives the following formula:

Starch, 250 gm.; precipitated calcium carbonate, 150 gm.; dried alum in very fine powder, 15 gm.; boric acid, 15 gm.; carbolic acid, 3 gm. Aromatize with oil of citron.

## AMERICAN PHARMACEUTICAL ASSOCIATION.

The forty-first annual meeting of the American Pharmaceutical Association was called to order shortly after 3 P. M., on Monday, Aug. 14, 1893, in the Hall of Washington at the Art Palace, Michigan Avenue, Chicago, by Prof. J. P. Remington, President. On the platform were noticed a number of distinguished foreign honorary members and the officers of the Association. The absence of the Permanent Secretary, Prof. J. M. Maisch was soon noticed and the news of his serious illness spread very rapidly. After calling the meeting to order President Remington announced that owing to the absence of Secretary Maisch it had been found necessary to appoint a Secretary pro tem., and that he had selected Professor Whelpley, St. Louis, to fill that position. President Remington then introduced Dr. Peabody, chief of the Department of Liberal Arts of the World's Columbian Exposition, who had been chosen to welcome the Association to Chicago. After an enthusiastic reception, Dr. Peabody in welcoming the Association outlined the general object of the World's Fair from an educational point of view and gave, in detail, some information about the World's Fair Auxiliary. He called attention to the fact that for months past the halls had been filled by followers of various arts and sciences, whose deliberations had been recorded for the benefit of mankind. Of all these congresses none represented a higher or more useful branch of science than did pharmacy, for which reason he felt specially honored in having been selected to welcome representatives of such an important department. When the speaker began to refer to the rise and progress of the Western metropolis he became very eloquent. He referred to its institutions of learning, dwelling especially on those of Pharmacy. He further drew a comparison between the progress of Chicago and of pharmacy. Both, he said, had risen from humble surroundings and were steadily climbing upward and onward. In conclusion, the Doctor said: "I am here to-day to say to you all, that Chicago welcomes you most heartily to all that she has to offer, to all the privileges, to all the enjoyments connected with the Fair, to her homes and her social life—whatever you may desire to enjoy; and I trust that when you shall return to your homes and your duties, you will return feeling that Chicago, as a host, has given to you of her abundance, and that she has given you occasion to remember her with satisfaction and delight in all your future life." [Applause.]

President Remington then called on A. P. Preston, of Portsmouth, N. H., first Vice-President of the Association, to reply to Dr. Peabody on behalf of the Association. Mr. Preston cordially thanked Dr. Peabody for his eloquent words of welcome. The association, he said, came to Chicago for three purposes—first, to bring together the greatest gathering of pharmacists the country had ever seen; second, to enable its members to see the wonderful "White City," about which they heard so much; third, to enable them to see something of Western enterprise, the reports of which had penetrated even to the depths of New England, from whence he himself came. People from other parts of the country, Mr. Preston said, could not realize the effect of citizens of that region by their first pilgrimage to the West, as the latter were brought up in the idea that there could be no good outside of New England. Having seen the West and its great metropolis, the speaker observed that he felt prouder than ever of the great country of which it formed a part. In conclusion, Mr.

Preston paid the following tribute to the people of Chicago, he said that "here they have the grandest people, the most whole-souled people that can be found anywhere, and the people who are always glad to welcome their visitors. Under such auspices the meeting of '93, could not fail to be not only a grand success, but one of the most enjoyable in the annals of the Association." [Applause.] Upon conclusion of Mr. Preston's address, Henry Biroth, the local Secretary, at the request of President Remington, made a brief address of welcome, referring to the interesting programme arranged for the entertainment of the association by the local committee.

Vice-President Watson having been called to the chair, President Remington read his annual address, which was very well received. The president referred to the fact that this was the second meeting of the association in the Western Metropolis, that a number of foreign visitors were present among whom were prominent officers of European pharmaceutical societies, and that for the first time delegates from the American Medical Associations were present. He dwelled on the fact that this showed the beginning of that period which had been sought for so long when physicians and apothecaries may meet on common ground and labor together to mutual advantage. The beneficial effects resulting from the establishment of the section of *Materia Medica* in the American Medical Association, led the speaker to believe that the time was not far distant when a joint body or commission would be formed having for its object the securing of needed legislation to restrict the practice of both professions to those only, qualified to perform such responsible duties. The chairman further paid tribute to the energies of the chairman of the committee on revision of the *Pharmacopœia*, Dr. Chas. Rice, who had sent the first copy to the meeting for inspection. President Remington pointed out the changes which had been introduced into the *Pharmacopœia*, one of the most striking being the adoption of the metric system in expressing "solids by weight," and "liquids by measure." Another change is noticed in a definite time being set when the *Pharmacopœia* became official, January 1, 1894. Standardization was restricted to three drugs, opium, cinchona and nux vomica. The changes in nomenclature were noticed, especially the dropping of "of" in the common names of chemicals, and the creation of a new class called "emulsa."

The president referred also to the activity of the preparation of synthetical compounds. These compounds, when they could not be produced otherwise than under a patented process, or if protected by proprietary right, were excluded from the *Pharmacopœia*. On motion of Mr. Kirchgasser, the president's address was referred to a committee of three, and the chair appointed Messrs. C. L. Diehl, H. R. Slack and H. M. Whitney. Mr. Kennedy, Secretary of the council, read the council's report on membership. On motion of Mr. Zwick, the chair was requested to name a committee of three to frame a resolution expressing the deep sympathy of the association with Permanent Secretary John M. Maisch in his present illness, and also the deep regret experienced in losing his valuable services. The chair appointed Messrs. Hoffman, Zwick and Ebert.

President Remington then introduced Mr. Michael Carteighe, President of the Pharmaceutical Society of Great Britain. Mr. Carteighe gave expression to his disappointment in the absence of Prof. Maisch. He said he had special reasons for this as he had a surprise in store for him. He had in his possession a medal, the Hanbury Medal, which had been awarded to Prof. Maisch.



He furthermore drew attention to the fact that pharmacy as carried on here and in England bore a great similarity, and differed materially from the way it was carried on, on the continent of Europe, where it had the protection of the government.

Mr. Lord, delegate from the National Wholesale Drug Association, addressed the association, stating that the association which he represented was in hearty sympathy with the aims of the A. P. A., and wishes success to the labors of the association in its commercial section. The secretary then read the following reports by title: Committee of Arrangements, Henry Biroth; delegation to visit the American Medical Association, by Jas. M. Good; treasurer's report, by S. A. D. Sheppard. Professor Fennel moved that the American Pharmaceutical Association extend to Dr. Rice and his associates on the committee its thanks for the presentation of the U. S. Pharmacopœia to American pharmacists, and that the members pledge themselves to make the U. S. Pharmacopœia the standard work from Maine to California.

After a recess of five minutes, the following nominating committee was appointed:

Alabama—P. C. Candidus, J. J. McAfee. Arkansas—W. L. Dewoody, D. E. Shandel. Colorado—J. W. Turrel, C. M. Ford. District of Columbia—W. S. Thompson, S. L. Hilton. Florida—S. P. Watson, C. C. Harris. Georgia—Paul Penniston, W. R. Cornell. Indiana—L. Eliel, G. H. Sloan. Illinois—C. S. N. Hallberg, H. W. Martin. Iowa—Rosa Upson, G. H. Schafer. Kansas—Mrs. M. O. Miner, L. E. Sayre. Kentucky—G. A. Zwick, W. H. Averill. Louisiana—A. L. Metz, C. L. Keppler. Maryland—L. Dohme, Wm. Simon. Massachusetts—C. H. Price, F. H. Butler. Michigan—J. Vernor, G. Gundrum. Mississippi—J. C. Means. Missouri—J. M. Good, H. M. Pettit. New Hampshire—A. C. Preston. New York—L. F. Stevens, J. Pfeiffer. North Carolina—R. Simpson, Mr. Charis. Ohio—L. C. Hopp, G. L. Hechler. Oregon—G. C. Blakely. Pennsylvania—C. S. Heinitsch, Wm. McIntyre. Tennessee—A. A. Yeager, J. O. Burger. Virginia—W. E. Church. Wisconsin—E. Kremers. Canada—S. Lachance, Quebec. From the association-at-large—Messrs. Patton, Ebert, Whelpley, Whitney and Trimble.

The president appointed the committee on time and place of next meeting—Messrs. Sheppard, Ford, Whelpley, Eliel and Patterson. At the request of President Remington, Prof. Good reported, on behalf of the delegates, to visit the American Medical Association. Among other things, the speaker said that the resolution passed by the American Medical Association that the U. S. Pharmacopœia shall be adopted by the physicians in prescribing and pharmacists in compounding, and that both it and the National Formulary be made text-books in the medical and pharmaceutical schools, originated in the section of *Materia Medica*.

On motion, the report was received and referred.

The convention here, on motion, adjourned to meet on Tuesday, at 9 A.M.

*Second Session.*—The session was called to order by President Remington, in Hall XXIV, of the Art Palace, and the proceeding opened by the presentation of a report on membership by Mr. Kennedy; 113 applications for membership had been received and had been recommended for favorable consideration. On motion, the applicants were invited to become members of the association.



Professor Good, on behalf of the committee on nominations, presented the following report :

For president, Edward L. Patch, of Boston ; first vice-president, E. O. Daly ; second vice-president, W. Rogers, Millersville, Ky. ; third vice-president, Charles Caspari, Baltimore, Md. ; treasurer, S. A. D. Sheppard ; permanent secretary, John M. Maisch ; reporter on progress of pharmacy, Henry Kraemer, New York ; members of the council ; C. L. Diehl, C. M. Ford and Wm. C. Alpers. A ballot for the election of president was then taken, Messrs. Overstreet and Hamilton acting as tellers. The ballot resulted in the unanimous election of Prof. Patch. On motion, the secretary was directed to cast an affirmative ballot for the other nominees, which was done, and their election announced by the chair.

Mr. Sheppard, on behalf of the committee of time and place of next meeting, reported that three places had been presented for consideration, Asheville, N. C., Hot Springs, Ark., and Denver, Col. After consideration the committee decided on Hot Springs, and the time fixed for first Monday in June, 1894. After an excited discussion Asheville was substituted, and Mr. W. G. Smith, of Asheville, selected as local secretary. Prof. C. L. Diehl reported on behalf of the Committee on National Formulary. Dr. Hoffman reported on behalf of the committee on resolutions to Prof. Maisch, the following : Professor John M. Maisch—The American Pharmaceutical Association assembled conveys to you the heartiest greeting and the sympathy of its members in your sufferings. They keenly feel and regret your absence, and trust that you may find consolation in the knowledge that their love and esteem are with you, and that your eminent and enduring services for the promotion of the association, and for the elevation and advancement of pharmacy will ever remain an ornament in the annals of American pharmacy." By a rising vote the resolution was unanimously adopted.

Mr. Kennedy reported that since the meeting of 1892, more new members had entered the association than ever before, namely 210.

Secretary Whelpley read a letter from Dr. Rice to the association, explaining his absence and asking for suggestions for further improvement in the work on the Pharmacopœia.

Henry Kraemer, reporter on progress of pharmacy, made a brief statement of the work done by him during the year, and, on motion, the report was accepted and referred for publication.

A recommendation was made in the above report that a bureau of information in matters pharmaceutical be established by the association, caused some discussion. The matter was finally settled by referring the recommendation to the council for consideration.

Prof. Fennel presented the report of the committee on credentials. The report of the treasurer, S. A. D. Sheppard, was next presented and showed an encouraging state of affairs, notwithstanding the financial disasters and the silver question.

On motion of Prof. Oldberg, the president was asked to send greetings to the British Pharmaceutical Conference, then in session at Nottingham, England.

The next report was that of the committee on prize essays, submitted by Mr. Kennedy. Among other things it contained the recommendation that the resolution passed in 1887 be enforced which provided that \$150 be awarded to

the writers of the three most valuable papers presented to the scientific section, and further that the recipient of the Ebert prize should not be debarred from receiving one of the Association prizes.

Prof. Whelpley presented the report of the committee on revision of the pharmacopœia, saying that too short a space of time since the publication had elapsed to make any acceptable criticisms or laudations of the work.

Prof. Oldberg made a short statement concerning the work of the committee on the International Pharmaceutical Congress.

Prof. Fennel presented a resolution appropriating \$1,000 placed at the disposal of the seventh International Pharmaceutical Congress for the compilation, publication and distribution of an international pharmacopœia. After considerable discussion the resolution was adopted.

Invitations were received from Armour & Co. to visit their packing houses; from Merck & Co., offering the hospitalities of the Merck Building at the Exposition, and from the Illinois College of Pharmacy, to inspect their new building and laboratories.

The Association then adjourned till 9 A.M., Saturday, August 19.

*Section of scientific papers.*—The first session of the section was called to order by Prof. C. T. P. Fennel, in Hall XXII, of the Art Palace, on Tuesday, at 3 P.M., Prof. F. G. Ryan acting as secretary.

The proceedings were opened by reading the chairman's address, which referred to the progress made by pharmacy within the last year, calling special attention to American pharmacy as shown by the displays at the World's Fair. He also briefly referred to the publication of the pharmacopœia. On motion of Prof. Whelpley, the address was received and referred.

The report of the committee on the ephemeral publication of the new remedies was called for. Prof. Hallberg, on behalf of the committee, stated that not until the publication of the Proceedings, was he aware of the existence of the committee and that on corresponding with the other members they decided to let the matter rest on account of the short time intervening.

Nominations for the ensuing year being in order, Prof. Whelpley nominated Prof. L. E. Sayre, who in turn nominated C. M. Ford, of Denver, for the position of Secretary.

The reading of papers was opened by Prof. Sayre with an interesting paper on *Composition of Taraxacum root at various seasons of the year* and Prof. Patch, *Laboratory Notes*. The next paper as by Prof. Hallberg, on *Beef Extracts, their Manufacture, Composition and Therapeutic Effects* which created quite a discussion on the advisability of using names in place of number as was the practice of the association heretofore to designate the different samples. A motion of Prof. Good requested the writer to use number was at last carried. Mr. H. S. Wellcome, of London, read the next paper, entitled *On an Improved Shape for Suppositories and Bougies as Vehicles for Medication* (see A. J. P., p. 433). After this came *Atomic Weights*, by Dr. Gustavus Hinrichs, and *Bougies*, by Nicholas Pritzker.

The section then adjourned until 8 P. M.

*Second Session.*—The section was called to order at 8 P. M., and the election of officers for the ensuing year was held. On motion of Prof. A. B. Stevens, the Secretary was instructed to cast ballots for the unanimous election of the nominees, Messrs. Sayre and Ford.

The reading of papers was resumed, the following being presented: *On the Preparation of Oak Tannins with Reference to the Special Use of Acetone as a Solvent*, by Prof. Henry Trimble (see A. J. P., p. 435). *Caulophylline (from the Root of Caulophyllum Thalictroides)*, by Prof. J. U. Lloyd. *The Value of Titration with Volumetric Acid Solutions as a Means of Assaying Alkaloidal Drugs and Galenical Preparations*, by Prof. Chas. Caspari, Jr., and Alfred Dohme. *Canadian Potash*, by Professor Reid, of Montreal. In the discussion which followed Prof. J. U. Lloyd called attention to the fact that the Canadian Potash was of better quality than that of American manufacture.

Then followed *Change of Volume when Liquids of Different Densities are Mixed*, by Wilbur S. Scoville; *The Value of the Pharmacopœial requirements for Oil of Cloves*, by Prof. C. T. P. Fennel; *Refractometers and their Uses*, by Prof. W. F. Edwards; *A Microscopical and Analytical Study of Coca Leaves*, by Dr. A. R. L. Dohme; *Commercial Varieties of Opium*, by the same; *Hydrastis Canadensis*, by F. A. Thompson; *Contribution to the Literature of Strychnine Determinations*, by J. B. Nagelvoort; *Gelsemium Sempervirens*, by Chas. O. Hill; *Colocynth*, by Geo. Wagner; *Investigation of Menthol Derivatives*, by Prof. E. Kremers; *An Aseptic Irrigating Tube*, by Adolph Levy.

The installation of the new officers was next in order, which took place at about 11 o'clock, when long speeches were out of the question.

In terminating the proceedings the chairman referred to the good attendance, notwithstanding the many rival attractions and also to the papers presented, which were of unusually high character.

The section then adjourned to meet in Asheville in September, 1894.

*Section of Pharmaceutical Education and Legislation.*—This section was called to order on Thursday, August 17, at 9 A.M., by Dr. R. C. Eccles.

In his annual address, the chairman dwelt especially on the legislation in the different states, referring to the good and bad points of the various enactments. He invited the State associations, whose duties, he said, it was to examine their laws thoroughly, to express their opinions on pharmacy laws, so that the matter could be brought up before the association at its next meeting. On motion, the address was referred to a committee of three, consisting of Messrs. Sayre, Mittlebach and Caspari.

The paper which followed was *History of American Pharmacy*, by S. M. Colcord. A remark of Alphonse Major, as to the rise of saloonkeepers, gave rise to a heated discussion, ending with the announcement that at proper time charges would be brought by Mr. Eliel against Mr. Major for conduct unbecoming a member. Mr. Major replied that his remark was meant as a joke, but the chair declared him out of order.

The nomination of officers being next in order, Dr. Eccles was again nominated, as was also Mr. L. C. Hogan.

The next paper read treated of: *Legislation and Boards of Pharmacy, Education and Colleges of Pharmacy*, by Prof. E. L. Patch. As a result of this paper, motion was carried to appoint a committee of three to suggest a line of policy to be devised by this Section with reference to admitting graduates of pharmacy without examination by boards of pharmacy. The resolution offered was to the effect that it was best that the State boards did not recognize the diplomas.

The next paper was offered by the Secretary of the Lombardini Pharmaceuti-



cal Association of Milan, Italy, translated by Dr. Chas. Rice, giving an account of present status of pharmacy in Italy. The paper was on motion referred to the International Congress.

*The relation between gas volumes and molecular weights*, by Prof. Wm. Simon, was illustrated with some models of ingenious construction which he had invented for lecture work.

*Why do so many pharmacists forsake their profession for the study and practice of medicine?* by Henry N. Slack, was next read.

Mr. Michael Carteighe next compared the pharmaceutical legislation with that of the United States. Among other things he thought the English practice was a good one to have examinations by the Pharmaceutical Society and the government to be represented by members of the Privy Council.

Following Mr. Carteighe the following papers were presented: *Should candidates for graduation in pharmacy be able to make all preparations, a process for which is given in the United States Pharmacopœia?* by Prof. L. E. Sayre. *What are the benefits and what, if any, are the losses to the community and to pharmacists by reason of the existence of pharmacy laws?* by H. M. Whitney, and another answer to the above question by S. A. D. Sheppard. *Are pharmacy laws a benefit to pharmacists?* by John H. Manning. A paper with resolution, which created considerable discussion and was later referred to a committee of three, Messrs. Sheppard, Simon and Ford, was: *What should be the requirements of graduation in American colleges of pharmacy?* by Prof. Hallberg.

Prof. Sayre offered a resolution referring to certain statements in the chairman's address in regard to ill-advised legislation.

The section then adjourned until the afternoon.

*Second Session.*—The section was called to order at 3 P.M., and the proceedings opened by the Secretary's report, dealing especially with the prosecutions under the pharmacy laws.

A paper by Dr. Bowker on *Legislation in Pharmacy* was presented but rejected by the section.

*Draft of a proposed bill regulating the sale of patent medicines*, by Prof. Hallberg was referred for publication. The following papers were then read: *Would it be a gain or loss to pharmacists to compel apprentices to pass a board of pharmacy examination on their general education before permitting them to begin work in a drug store?* by Rosa Upson. Two papers by W. Bodemann, with reference to some special lines of pharmaceutical legislation. *More chemistry needed—a plea for the extension of this branch of a pharmacist's training*, by A. R. L. Dohme. *Should any candidate be permitted to graduate in pharmacy before he is able to apply the tests and assays of the United States Pharmacopœia*, by Prof. Simon. A paper by C. M. Troppmann, *Danger of our Prescription Business*, was referred to the Section of Commercial Interests.

The Committee appointed at the morning session to consider Prof. Hallberg's resolution asked for time until the next annual meeting.

Mr. Ebert made a few remarks regarding legislation, asking among other things for registration of proprietors only. Quite a number of members participated in the discussion which followed.

*Change the Laws*, by H. Bodemann, referred especially to the present trademark laws.



The next business in order was the election of officers, the nominees being elected.

The section then adjourned for the year.

*Section of Commercial Interest.*—The section was called to order on Thursday, Aug. 17, at 8 P.M., by Chairman W. H. Torbert. Mrs. M. O. Miner, of Iowa, acting as secretary. The chairman's address dealt principally with the A. P. A. plan for the protection of rates on proprietary articles. The chair remarked that dealers who were cutters in self-defence had been supplied by the wholesale trade.

After considerable discussion a resolution by W. C. Alpers in regard to druggists to recommending preparations of their own in place of proprietaries called forth a lengthy discussion, which ended in the resolution being laid on the table.

Another resolution, by S. A. D. Sheppard, indorsing the action of the delegates in leaving the execution of the A. P. A. plan in the hands of the Interstate League was adopted.

Nomination and election of officers being in order, Mr. Rogers, of Louisiana, and Mr. T. N. Jamieson, of Chicago, were elected chairman and secretary, respectively.

The section then adjourned for the year.

*Final general session.*—At 10 A.M., Saturday, Aug. 19, the final session of the American Pharmaceutical Association was called to order in Hall XXIV, of the Art Palace. Mr. Whitney, on behalf of the committee on the president's address, presented its report which was received and adopted. Pursuant to an invitation from the secretary of the Pan-American Medical Congress, convening in Washington in September, the Chair appointed Messrs. W. S. Thompson, Charles Caspari and F. G. Ryan as delegates.

The chair then appointed the Committee on Prize Essays, consisting of Prof. Good, W. J. M. Gordon and J. H. Stein.

On motion of Prof. Whelpley, the Chair was instructed to appoint a special committee of membership consisting of one from each State and Territory and from District of Columbia, Nova Scotia, and Quebec, for the purpose of soliciting new members and to report the same to the Committee on Membership.

Mr. Eliel then brought the charges against Mr. Major, the matter after discussion being referred to the council with power to act.

Prof. Whelpley moved a vote of thanks to the druggists of Chicago and the members of the Illinois Pharmaceutical Association for the entertainment and courtesies shown.

Prof. Remington then introduced Dr. Woodbury, the accredited delegate from the American Medical Association. Dr. Woodbury dwelled especially on the relation between druggist and physician, and in closing reference to Prof. Remington's excellent work toward establishing the Section of Materia Medica in the American Medical Association.

The installation of the new officers was now in order, so the chair appointed Messrs. Simon and Gordon to conduct them to the platform. The officers all replied in words of thanks for the honor shown them. The only absent officer was Prof. Maisch, from whom a reply to the resolutions was read.

On motion of Mr. Zwick, the retiring officers were tendered the thanks of the Association, and on motion of Prof. Remington a vote of thanks was

tendered to Mr. Henry Biroth, and the local committee for their kind and laborious services toward entertaining visitors and making the Chicago meeting a grand success and one memorable in the history of the Association. The Association then adjourned to meet in Asheville the first Monday in September, 1894.

In the way of entertainment a number of things were offered. Wednesday and Friday had been set aside for visiting the Fair. On Tuesday evening a reception was tendered by the local committee at the Casino, on the Fair grounds, where several hours were enjoyably spent. On the evening of Wednesday, August 16, a banquet at the Fair grounds, took place when the following toasts were responded to. The American Pharmaceutical Association, Prof. J. P. Remington; The International Pharmaceutical Congress, Michael Cartleighe; The Illinois Pharmaceutical Association, Dr. H. Lee Hatch; The Pharmaceutical Schools, Prof. A. B. Prescott; The World's Columbian Exposition, Dr. S. H. Peabody; The Pharmaceutical Press, Dr. H. M. Whelpley; The City of Chicago, Geo. P. Engelhard; The Ladies, Prof. C. S. N. Hallberg. Prof. Remington acted as toastmaster. A Lake excursion which had been arranged to follow the final adjournment, had to be abandoned owing, to the condition of the Lake. The Association went in tally-ho coaches to Lincoln Park where a luncheon and reception had been planned by the local committee.

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## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

*Philadelphia College of Pharmacy.*—The Board of Trustees of the Philadelphia College of Pharmacy have called Professor Edson S. Bastin, A.M., F.R.M.S., to the Chair of Materia Medica and Botany, made vacant by the death of Professor John M. Maisch. Prof. Bastin has accepted this call, and will conduct the coming course of lectures in the College.

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## EDITORIAL.

In this number our readers will find a short résumé of the work of the meeting of the American Pharmaceutical Association.

Through the sickness of Prof. John M. Maisch we have had no one at the meetings to obtain a report of the same in time for our last issue. We therefore offer it this month. The only thing we could do under the circumstances was to cull from different sources, but we endeavored to give as full a résumé as possible.

The following letter explains itself:

DEAR SIR:—I beg to ask you the favor kindly to insert the following publication in the next issue of your esteemed paper:

“It is well known that the next, the VIII International Congress of Hygiene and Demography, will be held at Budapest in September of next year, under the high patronage of His Imprl. and Royal Majesty. The preliminary work is already progressing very briskly. The papers of subject for the 19th hygienic and 7th demographic sections being already selected, the referees for these papers have also been asked to receive them, and many of these gentlemen have already sent in their acceptance of these duties. The series of further

questions, will be arranged according to sections about the beginning of next month, and will then be sent out to the foreign scientists, in order that the preliminary works for the scientific part of the Congress may as nearly as possible be completed before the beginning of autumn.

"The Executive Committee especially desires to realize as far as possible the decisions of the London Congress. Special international committees have been organized with regard to several decisions accepted at the London Congress; they are at present occupied with the solution of the various questions thus mooted.

"To England it will be of some special interest to know that one important decision that was accepted at the instigation of the London Congress. This decision refers to the organization of a separate section for tropical countries. The president of this special section will be Dr. Theodor Duka, and the two secretaries will be Dr. Isambard Owen and S. Digby, Esq. These gentlemen kindly consented to accept these posts, and are now engaged arranging the program of this section.

"The honor presidents of the several sections will be elected by the Executive Committee as soon as the names of those foreign celebrities shall be known who will take part in the Congress.

"After the termination of the Congress several excursions will be arranged, amongst which one will be to the Irongate on the lower Danube, to Belgrad and to Constantinople, which doubtless will be of some attraction."

I remain, dear sir,

Yours obediently,

PROF. MÜLLER, M.D., *Chief Secretary.*

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*The Pharmacopœia of the United States of America.*—Seventh decennial revision. 1890. By authority of the National Convention for revising the Pharmacopœia, held at Washington, A. D. 1890. Official after January 1, 1894. Published by the Committee of Revision. 1893.

This long-looked for work has appeared and is now ready for distribution. By this revision 87 new articles have been added and 90 dropped, being less than in the sixth revision, when it was 259 and 224, respectively. The titles have been changed in a number of instances—Latin titles 56 and English titles 227. The large number of changes in the latter instances, as compared with 1880, is due to the adoption of the modern nomenclature. In regard to preparations, we find the first class of 1880, abstracts, entirely dropped, in the fluid extracts there is an increase of 10, and in solid extracts an increase of 9 over the last revision. Two elixirs are now official, the old simple elixir being replaced by an aromatic elixir, and elixir of phosphorus having been added. The tinctures have been increased by two. To one tincture a method of assay has been added. Another change, that in the preparation of the aromatic waters, has been made; these are now prepared with phosphate of calcium in place of cotton. Among other changes to be noted are the addition of a new class of preparations, "Emulsa," under which heading are placed 4 mixtures of the former revision. Suppositories are represented by one, that of glycerin, and glycerites by 4. The newer remedies and drugs are represented by acetanilidum, adeps



lanæ hydrosus, cinnamomum saigoncum, convallaria, eucalyptol, hydrastininæ hydrochloras, hyoscinæ hydrobromas, menthol, naphthalinum, physostigminæ sulphas, pyrogallol, resorcinum, salol, sparteinæ sulphas, strontium salts, strophanthus, Terebenum and terpini hydras. Another change which strikes one more forcibly than all others is the discarding of parts by weight and the substitution of the metric system to express the idea of *liquids by measures* and *solids by weight*. The printing and further make-up of the book is good. A beginning of a thorough review will be found on another page.

*Proceedings of State Pharmaceutical Associations.*

The following issues have been recently received :

*Alabama*.—Twelfth annual meeting held in Birmingham, May 9 and 10, 1893. See July number, p. 367, of this Journal ; pp. 51, 8. P. C. Candidus, Mobile, Secretary.

*Connecticut*.—Seventeenth annual meeting, held in New Haven, February 7 and 8, 1893. A part of the book is taken up by the laws of Connecticut pertaining to pharmacists. Original papers published are : Sulpho-salicylic acid as a urine albumen test, by George McGuire. Pill excipient for general use, by N. A. Upham, besides several other papers. Next meeting in Hartford, February 6 and 7, 1894, pp. 118. Frederic Wilcox, Wichita, Secretary.

*Kansas*.—Fourteenth annual meeting, held in Wichita, May 23, 24 and 25, 1893. See August number, p. 412, of this Journal, pp. 154. Mrs. M. O. Miner, Hiawatha, Secretary.

*Mississippi*.—Second annual meeting, held at Jackson, May 9 and 10, 1893. See August number, p. 412, of this Journal, pp. 89. Carson Lemly, Jackson, Secretary.

*Pennsylvania*.—Sixteenth annual meeting, held in the Eureka Springs Hotel, Saegertown, June 13, 14 and 15, 1893. See August number, p. 412, of this Journal, pp. 130. Jacob A. Miller, Harrisburg, Secretary.

*New Jersey*.—Twenty-third annual meeting, held at Atlantic City, May 24 and 25, 1893. (See p. 412 of this Journal.)

*Tennessee*.—Eighth annual meeting, held in Nashville, May 17 and 18, 1893. See August number, p. 414, of this Journal, pp. 39. Will Vickers, Murfreesboro, Secretary.

*Illinois*.—Thirteenth annual meeting, held at Springfield, June 7 and 8, 1892. Accompanying this is the annual report of the State Board of Pharmacy, containing a list of registered pharmacists and assistant pharmacists for 1892.

*Quebec*.—Twenty-third annual meeting, held at Montreal, June 13, 1893.

*Texas*.—Fourteenth annual meeting, held at Dallas, Tex., May 9, 10 and 11, 1893. (See p. 414 of this Journal.)

*Beitrag zur Wirkung des Trionals*.—Von Dr. Koppers, Separat-Abdruck, aus der R. Internationalen Klinischen Rundschau, No. 29 und 30. 1893.

Contribution on the action of Trional. By Dr. Koppers. Reprint from Intern. Klin. Rundschau, No. 29 and 33980.

Notes taken in the private practice of Dr. Seifert, of Würzburg, and of the author.

*Therapeutical Superstition*. By Geo. T. Welch, M.D., ex-president of N. J. State Medical Association.

A reprint from the Transactions of the Medical Society of New Jersey, 1893.





# THE AMERICAN JOURNAL OF PHARMACY

NOVEMBER, 1893.

THE UNITED STATES PHARMACOPŒIA OF 1890.

BY GEORGE M. BERINGER, A.M., PH.G.

[*Continued from p. 473.*]

The extreme conservatism of the chemical nomenclature, is in marked contrast to the radical changes that have been adopted in giving the botanical names of plants and the citation of authors for such names. The committee have adopted the rules of the Botanical Club of the A. A. A. S. which were adopted as recently as August 19, 1892, and have published these rules on page XXXII, adding another unnecessary page to an already too large volume. The Pharmacopœia is not intended as a botanical text-book, much less as a botanical authority, and it is presumed that the committee were fully acquainted with the unsettled state of botanical nomenclature, before lending their apparent weight of authority by endorsing these rules.

In recent years, the battle of nomenclature caused by a disagreement as to the meaning of "the law of priority of publication," has so obscured the botanical horizon, that botany has appeared more as a study of plant names than of plants, and a science already loaded down with a mass of technical terms, is being buried with synonyms. The Paris code of 1867, stated that *in transferring* a species from one genus to another, the specific name is maintained. The strict nomenclaturists have contended that, in accordance with the idea that priority of publication alone should give authority, the new binomial should be made by using the oldest specific name commencing with Linnæus Species Plantarum, 1753, and for generic with

the Linnæus Systema of 1735.<sup>1</sup> They would have no regard for the appropriateness, or what Watson has termed the *convenience* of the name. It is apparent that such a rule destroys stability of names, as new discoveries of older names would cause continual changes.

It is hoped that the committee were aware that the more conservative botanists, whose authority had been heretofore recognized, were not in sympathy with these radical views on nomenclature. Asa Gray did not adopt them and Sereno Watson, on his death-bed, took occasion to dictate an article giving the views held by both Professor Gray and himself on this subject. (See the Botanical Gazette, June, 1892, p. 169.)

The views held by these American authors were substantially those adopted at Kew. Professor Jackson, of that institution, writes (Britten's Journal of Botany, 1887, p. 69): "Our practice is to take the name under which any given plant is placed in its true genus as the name to be kept up, even though the author of it may have ignored the proper rule of retaining the specific name when transferring it from its old genus to the new; when, at least, such name is not already in the genus receiving the accession. To wantonly set aside the joint name thus given and to publish a new name by joining the oldest specific name to the true generic is a mischievous practice, which should never be condoned; it is adding to the already vast mass of useless synonyms, and is more likely to be the offspring of vanity than a sincere desire to promote science."

Sassafras aptly illustrates the two methods of naming. In 1836, Nees rightly named the plant *Sassafras officinale*, and this name has been generally adopted since and recognized in the past editions of the Pharmacopœia, and in Gray's Manual and other American botanical works. Previous to this Nuttall had applied *Evosmos albidus* and Linnæus *Laurus sassafras*, and Salisbury, in 1796, *Laurus variifolia*. Otto Kuntze now proposes as the correct binomial (according to priority only), *Sassafras variifolium*, and the Pharmacopœia of 1890 states *Sassafras variifolium* (Salisbury), O. Kuntze, as the source of sassafras.

It is now a matter of record, that the very meeting that adopted the rules in the Rochester Convention of 1892, appointed a delegate to attend the International Botanical Congress held in Genoa, in

<sup>1</sup> The date 1753 will most likely be the date adopted for both generic and specific names by an international agreement.

September, 1892, at which this subject was a prominent topic of discussion, and an international committee was appointed to consider the same. The decisions of the Genoa congress have not been unanimously adopted and at the International Congress, called for August, 1893, at Madison, Wis., another attempt was to have been made toward an universal agreement. Dr. Otto Kuntze, the foremost nomenclaturist, accepts no authority, and on priority alone would set aside, as he says, hundreds of Bentham and Hooker's names for genera, and in his *Revisio Generum Plantarum* (1891) proposes changes affecting the names of many thousands of plants. By a single sentence, the generic name *Astragalus* is replaced by *Tragacantha*, changing thus the names of 1,500 species (*ibid.*, pp. 210 and 940). Strangely this change has not been adopted by the Pharmacopœia. It is known that the *botanical authorities* at Berlin, astounded by the confusion likely to result from this publication of Kuntze, proposed, in the latter part of 1892, amending the code of 1867, and have suggested a revision of the same and significant omen, exceptions to this law of priority in a number of genera covering about 5,000 species. It is a query if the nomenclaturists practically adopt their own suggestions and reclassify and label their herbarium specimens with each change proposed, or whether their theories remain on paper? It will also be interesting to note how many of these names will survive till the pharmacopœial revision of 1900.

This argument has been extended very much beyond what was originally intended. But the anomalous position of the committee is such as to cause comment. To cast aside well-recognized names and authorities, and to accept rules which were presented by a committee of the Botanical Section of the A. A. A. S. within 24 hours of the time of their appointment, and which had not withstood the test of application, and to reject rules adopted by the Chemical Section of the same Association when presented by a committee whose labors lasted for more than 4 years, seems inexplicable, particularly so, when the committee appointed by the International Congress of Botanists at Genoa, to consider this subject, had not completed their work.

There will always be a number of changes in the botanical names of plants, necessarily caused by mistakes in classification or other errors of botanists, for even they do err, as, for example, it is known

that in the Linnæan herbarium the names of *Cerastium viscosum* and *C. vulgatum* were transposed, and that Linnæus filius mixed the plants yielding Balsam of Peru and Balsam of Tolu. By thorough study of genera or orders by monographers, changes in accepted names became necessary. An instance is found in Aloes, where the studies of J. G. Baker, on *Aloinæ*, have made him an authority, whose determinations are to be accepted. Changes are likewise necessitated by newly-discovered materials and information regarding the true source of drugs, especially if these are obtained from countries whose flora has been but imperfectly studied. Examples of this are found in *Illicium*, which E. M. Holmes proved to be derived from *Illicium verum*, Hook. fil. (see Pharm. Journal and Transactions, August 11, 1888) and in *Pernambuco Jaborandi*, which the same author decides is from a previously unnamed species of *Pilocarpus*. These names are rightly adopted in the Pharmacopœia, and it is a matter for congratulation that Mr. Holmes had published this paper on *Jaborandi* before the appearance of the Pharmacopœia (Pharm. Journal and Transactions, June 10, 1893, p. 1005; see also Amer. Jour. Pharm., July, 1893, p. 351) so that the "ined" after *Pilocarpus Jaborandi*, Holmes, on p. 301, can be eradicated, as unpublished matter is *not accepted* as authority.

The citation of authors might be likewise simplified. If the authority of the maker of the new binomial (or as he has been called the synonym manufacturer) is to be accepted, let us be content, *for the Pharmacopœia*, with the statement of such author's name, which is sufficient to designate the plant intended. For the student of pharmacy, *Hedeoma pulegioides*, Persoon, is as good as *Hedeoma pulegioides* (Linné), Persoon; if Persoon and not Aiton (U. S. P., 1880) is author of *Gelsemium sempervirens*, then it is sufficient to write *Gelsemium sempervirens*, Persoon, not *Gelsemium sempervirens* (Linné), Persoon. If O. Kuntze's name is correct for *Sassafras*, why not write *Sassafras variifolium*, O. Kuntze, and not *Sassafras variifolium* (Salisbury), O. Kuntze? It is to be observed, that the latter form continually implies the authority of earlier botanists to names which they would never have accepted. The true aim of science is to simplify not to involve.

The changes in the titles of official preparations are not very numerous. In a number of extracts and tinctures it has been deemed advisable to designate, in the title, the part of the plant used



as Extractum Belladonnæ Foliorum Alcoholicum, Extractum Belladonnæ Radicis Fluidum, Tinctura Colchici Seminis, etc. Opium is again said to be deodorized not denarcotized. It is a query, which is the most important, the odor or the narcotine extracted by the use of ether? If the latter, then denarcotized, or if that is not correct, then as suggested denarcotinated would be correct. Sapo Mollis is the new name for Sapo Viridis of the Pharmacopœia of 1880, and a formula is given for preparing it from linseed oil and potassa. The commercial article was only very rarely found to be green, and that only when it was made from hemp seed oil. The Tincture of Green Soap, 1880, is now Liniment of Soft Soap. The term *mistura* is now officially restricted to those preparations in which insoluble material not of an oily character is suspended in aqueous solution by the use of gum or other viscid material. As a result, ammoniac, almond, asafoetida and chloroform mixtures of 1880 are now classed as Emulsions, under the Latin title "*Emulsum*." But the remedies which physicians *now prescribe* under the name of "*Emulsions*" are not represented. It would have been a *practical experiment* and a taking one to have introduced a "standard" formula for (say) Emulsion of cod liver oil with hypophosphites. It is not too late to teach our medical brethren to write *Emulsum Olei Morrhuæ cum Hypophosphitum, U. S. P.*, instead of Scotts, Phillips, etc. I know someone says, "We have a National Formulary," but the doctors don't know that book. It is a book of druggists' formulas in the preparation of which they have not taken any part or interest. This would in a very large measure stop the present system of fighting patent medicines by increasing the number, wherein each druggist feels compelled to make a preparation after his own formula, *just as good* as the other proprietary. We want something that is not "as good," but the best, because it has the stamp of official authority.

The Pharmacopœia, to remain the authority, must be *abreast* of the times. It must neither theorize in advance nor retain obsolete ideas. *Standard* formulas must be introduced for remedies prescribed daily with success, and those whose use has become only occasional, can safely be relegated to the formularies. The "*ideal*" Pharmacopœia of some is a book of simples. Such it never has been and never can be made.

Liquor Ferri et Ammonii Acetatis is the new name for Basham's

mixture. While "mistura" is hardly an appropriate name for a clear liquid preparation, the term liquor strikes us very strangely for a preparation containing over twenty per cent. of flavoring and sweetening material. Would not "Elixir" have been a more appropriate name?

It is to be observed that Acetum Opii and Acetum Scillæ are now made by maceration instead of percolation, the strength remaining about the same as in 1880.

There are some changes in the acids of the Pharmacopœia, requiring notice. Volumetric solution of potassic hydrate with phenolphthalein as an indicator, is generally adopted for determining strength. Acid, acetic, still remains the 36 per cent. acid and the glacial acid 99 per cent. It would have been well to have changed the former to the 60 per cent. acid now being manufactured extensively.

It is to be regretted that under the title of benzoic acid both the natural and the synthetic acids are recognized and that in the tests for identification the latter seems to be given the preference. In the past, we have been taught to discriminate against the artificial acids and tests were proposed to detect such substitutes or adulterants of the natural. Those who have administered both, and benzoates made from both, distinguish a practical difference. The administering of the synthetic is generally followed by a disagreeable taste, very persistent and frequently producing nausea. This effect is most likely due to toluol derivatives remaining as impurities, but is nevertheless recognized and physicians are careful, in many instances, to specify "natural." Tinctura Opii Camphorata, should be stated as a benzoic acid preparation; Phenol, should be the title, with carbolic acid as a synonym. A volumetric method for determining the amount of absolute phenol present, and depending on the tribrom-phenol reaction, has been adopted. Likewise Chromic trioxide and chromic anhydride are given as synonyms for Acidum Chromicum; the former would be the correct title.

Diluted Hydrocyanic Acid is again a two per cent. solution in *water only*. The acid as distilled being condensed in a receiver containing distilled water, not diluted alcohol, as in the pharmacopœial process of 1880; and the distillation is stopped when the volume of liquid in the retort is reduced to one-half. The retention of the formula for making this acid extemporaneously, is surely unnecessary.

Diluted Hypophosphorous Acid is a new addition and is directed to be about 10 per cent. of the absolute acid. An acid of fifty per cent. strength has been supplied by the manufacturers for some years and, according to F. X. Moerk, is more stable than the weaker acid and should have been recognized in place of the dilute.

Nitric Acid is now 68 per cent. of  $\text{HNO}_3$  instead of 69.4 per cent. as formerly, and Sulphuric Acid is 92.5 per cent., with sp. gr. 1.835 instead of 96 per cent. On the other hand, Phosphoric Acid is now 85 per cent. instead of 50 per cent. The so-called syrupy phosphoric acid (85 per cent.) was in extensive use in 1880, and it is to be regretted, that it was not then made official, as prior to that date only the diluted acid had been recognized. There is, in the future, the likelihood of considerable confusion arising from this change of standard. The process of manufacture of phosphoric acid is rightly omitted, as it is such as to be hardly practical for the pharmacist to attempt.

Sulphurous Acid should hereafter contain 6.4 per cent. of sulphur dioxide instead of 3.5 per cent. as heretofore. Benzoinated Lard is again directed to be prepared by tying the benzoin in muslin and suspending in the melted lard for 2 hours. A superior product would be obtained by mixing the benzoin in a coarse powder with the lard and allowing to stand for six hours, then melt and strain. By the official process but a small portion of the benzoin becomes thoroughly exposed to the action of the lard.

Wool-fat, an ancient medicament, forgotten until recently introduced in the purified state by Liebrich, is recognized under the same name as that adopted in the "Additions to the British Pharmacopœia" in 1890, and the degree of allowable hydration (30 per cent.), is likewise the same in both standards. The statement that it is "miscible with twice its weight of water without losing its ointment-like character," requires some little modification. At the normal temperature only about an equal weight can be incorporated. "Unna says 105 per cent. at  $15^\circ \text{C.}$ " (see Amer. Journal of Pharmacy, 1886, p. 101); but, by warming the mortar, two hundred parts can be incorporated with 100 parts of the lanolin.

The ether of the Pharmacopœia of 1880, containing but 74 per cent. of ethyl oxide, has been discarded and only the stronger ether containing 96 per cent. of ethyl oxide is now official under the title *Æther*. The potassium iodide test, given on p. 28, we are

told, indicates by the absence of color produced "absence of aldehyde, etc." What is meant by "etc.," we presume ozone and hydrogen peroxide?

We now have Alcohol, Absolute Alcohol, Deodorized Alcohol and Diluted Alcohol, all official. Absolute alcohol should be placed with the reagents and test solutions. The official alcohol should, likewise, be required to conform to the percentage and tests for deodorized alcohol and the latter title dropped. The difference in commercial value between the two grades during the past year has only been from 5 to 10 cents per gallon. The U. S. P., 1880, required alcohol to stand the sulphuric acid test which is now given as the distinguishing test between these grades.

Diluted alcohol is again made from *equal volumes* of alcohol and water, and is 41 per cent. by weight or 48.6 per cent. by volume, instead of being 53 per cent. by volume, as in 1880.

The rules for making a lower percentage of alcohol from a higher percentage should be attached to the alcohol table in the appendix and not incorporated in the body of the book.

Purified Aloes remains. There may be some reason for directing its use in the pills containing that article and in compound extract of colocynth, but in the various tinctures which are necessarily filtered, the Socotrine aloes might have been directed. The use of aloes and not purified aloes in these tinctures appears to be universal.

Aloin is a newly admitted remedy. It is to be remarked that as one of the principal uses of a Pharmacopœia is to prevent uncertainty, to fix definite standards, it would have been well to have recognized only barbaloin under that title, especially as it constitutes almost entirely the aloin of commerce.

Dried Alum is now manufactured in such quantities and at such reasonable price that its preparation is seldom, if ever, attempted by the pharmacist and so the process of manufacture might have been omitted. Aluminum Hydrate should have been omitted; use would not necessitate its retention.

Ammonium Carbonate is tested for empyreumatic substances by supersaturating with nitric acid and evaporating to dryness when a colorless and odorless residue should be obtained; the permanganate test of the Pharmacopœia, 1880, being discarded. It is titrated with normal sulphuric acid solution, using rosolic acid as an indicator. But why not direct that 2.613 grm. of the salt be dissolved



and titrated instead of taking 7.84 grm. and dissolving and using only one-third for the test?

Ammonium Nitrate might have been dropped, as its use is almost entirely restricted to dental practice for preparing nitrogen monoxide and even here the purchase of the compressed gas in cylinders is generally deemed preferable to preparing the same.

In assaying Amyl Nitrite, a control experiment should be directed, using the same quantities of reagents and alcohol and under the same conditions without the amyl nitrite and the volume of any gas generated deducted from that found in the assay.

The method of making aromatic waters is again changed. The cotton method of 1880 is discarded, and in place of magnesium carbonate as a distributing material for the essential oil, as in 1870, calcium phosphate is now directed. This is not a new idea, but is one which I have frequently employed since 1878. It is to be remarked that as magnesium carbonate is very much more bulky or specifically lighter than precipitated calcium phosphate that an increased weight of the latter should be directed. The amount now directed is nearly the same weight as that of magnesium carbonate formerly ordered, and in most cases it will be found advantageous to increase this to 8 grm. instead of 4 grm. in the official formula. The process is otherwise unobjectionable, provided proper care is exercised in selecting precipitated calcium phosphate answering the official tests for purity. Several samples examined by the writer have contained notable quantities of carbonate, alkali and metallic impurities.

Bitter almond water, chloroform water and creosote water are direct solutions in water without the aid of any distributing material or chemical means.

Aqua Hydrogenii Dioxidi is the official name for *solution* of hydrogen peroxide, and an extensive formula for its preparation from barium dioxide and phosphoric acid is given, the strength adopted being 10 volumes of available oxygen when estimated by the process of assay given. This preparation and likewise chlorine water, and the ammonia waters should be classified with liquors or a new class of solutions. In addition to the other stringent requirements for Distilled Water it must now be free from carbonic acid. This is a degree of purity we fear not often attained, and where necessary it is easy to direct boiling to dispel the *carbon dioxide*.

On p. 48 we are told that triple orange flower water, the stronger orange flower water of the Pharmacopœia of 1890, is the *same* as the "Aqua Aurantii Florum, Pharm., 1880," and a formula is given for making "orange flower water" by dilution, and from this latter syrup of orange flower water is directed to be made. On p. 54 the same information is given regarding rose water, and it is to be observed, that the rose water and not the stronger rose water, is stated to be used in cold cream, whereas in the formula p. 440 the stronger is specified. The truth is that the terms "*triple*" and "*quadruple*" were applied by the manufacturers to indicate that the products were three and four times the strength of the official, and it has become the trade custom to make the pharmacopœial product from these by the necessary dilution. As orange flower water is only used for making the syrup and for flavoring the stronger only should be official. The stronger rose water, however, is too strong to be used undiluted in eye waters, injections, etc., and so rose water should be retained, but the stronger rose water should be directed for the pharmacopœial preparations. Confection of Rose should be given as a preparation containing stronger rose water, likewise, as mentioned, Ointment of Rose Water.

Silver Cyanide should be omitted; provided, the formula for the extemporaneous preparation of diluted hydrocyanic acid be likewise dropped.

The Subcarbonate and Subnitrate of Bismuth are now recognized as of varying composition and consequently chemical formulas are omitted. Bettendorff's arsenic test is directed in place of the Fleitmann's test of 1880, to prove the absence or limit allowable of that element.

Calamus is, as in 1880, *unpeeled*. How many druggists have the official?

Calx Chlorata is required to contain not less than 35 per cent. of available chlorine instead of 25 per cent. as heretofore, and this is in accordance with what can now be obtained in the best commercial article. Calx Sulphurata is now made by calcining a mixture of dried calcium sulphate, charcoal and starch, and the resulting product is required to contain at least 60 per cent. of calcium monosulphide, whereas the Pharmacopœia of 1880 specified "not less than 36 per cent."

To the list of preparations containing camphor must be added Linimentum Belladonnæ, Linimentum Sinapis Compositum and Pulvis Morphinæ Compositus and to those of Cardamom, Extractum Colocynthis Compositum, Tinctura Gentianæ Composita, Tinctura Rhei and Tinctura Rhei Dulcis. These are but samples of the "sins of omission," which appear all through the book. In the preparation of Cerate and Ointment, benzoinated lard should have been directed in place of "lard," and the same should have been adopted even in the compound cerates and ointments where lard is directed.

Camphor Cerate now contains 10 per cent., instead of 3 per cent., 1880, of camphor liniment, a commendable change.

Codeine Sulphate is used extensively where it is desired to give that remedy in liquid form as in bronchial affections and we are surprised not to find it introduced.

The directions for making Collodion are again changed. In the Pharmacopœia of 1880, the pyroxylin was directed to be macerated in the alcohol for 15 minutes and then the ether added. The directions of 1890 are to macerate for 15 minutes in the ether and then add the alcohol. Why not mix the ether and alcohol and then add the pyroxylin in portions, shaking after each addition? This, the method of 1870, has always yielded me the best results.

In the formula for Confection of Senna, on p. 99, it is to be noted that oil of coriander and not fruit is directed, yet, on p. 100, we are told that coriander is used.

Creosote is now correctly described as a mixture of phenols chiefly guaiacol and cresol, and that from beech-wood tar is preferred. The specific gravity and tests for other phenols and pyrogallic ethers are the same as adopted by the German Pharmacopœia.

Crocus should be accompanied by a test for the detection of soluble ammonium salts which have been used as adulterants. The amount of ash stated, 7.5 per cent., is too high. Examinations of a number of samples have yielded the writer 4.5 to 6 per cent. and in all pure saffrons was *non-fusible*, which should be stated in the official test.

Cubeb is notoriously adulterated and the description might have been accompanied by some description of the most common of these adulterants or some of the color reactions proposed.

What has been before said regarding the necessity of the Phar-

macropœia recognizing remedies frequently prescribed and furnishing standard formulas for the same, applies forcibly to the class of elixirs. The course of the Pharmacopœia, on this subject, has been erratic. In frequency of use, elixirs rank with tinctures, fluid extracts, syrups and aromatic waters and attention has been repeatedly directed to the necessity for official formulas for the most popular. Statistics compiled in 1888, show that Elixir of Calisaya was prescribed in about 3 per cent. of the prescriptions written in the United States and that the class was represented in from 54 to 108 out of every 1,000 prescriptions in various localities (see Amer. Journal of Pharmacy, 1888, p. 283), and their popularity seems still to be on the increase. The Pharmacopœia of 1880 *recognized* this demand by introducing Elixir Aurantii as a simple elixir or basic elixir, and this, using a vulgarity, "took well." In the Pharmacopœia of 1890, this is dismissed and two formulas are introduced, one for Aromatic Elixir and another for Elixir of Phosphorus. The former of these, *we presume*, is intended as a substitute for the simple elixir of the previous edition. If this was intended, it should have been given the synonym of basic elixir. The latter is, in this section of country, but very little used and, surely, no one can contend that a solution of phosphorus, even, when in 55 per cent. glycerin, will be a permanent preparation. We cannot explain what influence it has exercised in the minds of the committee, to be thus recognized and the frequently used Elixirs of Cinchona, Iron, Quinine and Strychnine, Potassium Bromide, etc., remain forgotten. The practical pharmacist, in answer to his appeal for bread, has received not a stone but a couple of small and dry bones.

The change in the formula for Belladonna Plaster, is to be noted. In the previous Pharmacopœias, it was directed to be made from a specially prepared extract of the root, made by extracting this with alcohol. It is now directed to be prepared from the extract of the leaf and one-half of the resin plaster is substituted by soap plaster. In Mercury Plaster and likewise in the Mercury Ointment, the mercury is disseminated by trituration with oleate of mercury. Lead Plaster is directed to be boiled in a "bright *copper* boiler." Why not use an enamelled or porcelain or other boiler? In the *official emulsions*, the formula for Emulsion of Chloroform is very different from that previously adopted for *mistura chloroformi*. The quantity of chloroform is somewhat reduced and the camphor is omitted



and as an emulsionizing agent tragacanth with oil of almonds to furnish blandness displaces the yolk of egg. This change is not approved.

There are thirty-three extracts official. The Pharmacopœia of 1880, added in the directions accompanying the formulas, permission to incorporate 5 per cent. of the weight of the extract, of glycerin to maintain its proper consistence. The Pharmacopœia of 1890, in a preliminary note (p. XLII), recommends 10 per cent. It is obvious, that in many cases this will be entirely too large a proportion.

The Pharmacopœia of 1880 directed the use of tartaric acid in the menstruum of all aconite preparations, because Duquesnel had proposed its use in the extraction of the root for alkaloid. It is noticeable that tartaric acid is now omitted in all the official formulas for aconite preparations.

The formula for Compound Extract of Colocynth directs that the purified aloes should be melted, then the alcohol, soap, extract of colocynth and resin of scammony added and the heat continued until a homogeneous mass yielding a brittle thread be obtained; the cardamom is then added and the product powdered. Starting with purified aloes and powdered resin of scammony and extract of colocynth and cardamom, why not direct the soap in *fine* powder and reduce the mixed products to a powder by triturating. The heating on the water-bath with alcohol to produce a mass to be then reduced to a powder seems wasteful of both time and material. In both the Extract and Fluid Extract of Conium acetic acid is directed in place of the hydrochloric of the Pharmacopœia of 1880. Extract of Ergot is directed to be made by evaporating the fluid extract to a pilular consistence and not to a definite weight as in 1880. The extract of ergot should be an aqueous extract, yielding a product entirely soluble in water and made by extraction with water containing only sufficient alcohol to prevent fermentation of the ergot. I would suggest the following process as yielding an excellent product suitable alike for internal administration or hypodermatic injection. The ergot in moderately fine powder is extracted by percolation with purified benzin, then dried and then percolated with a menstruum of 1 part by volume of alcohol and 9 of water. The alcohol is recovered by distillation and the product evaporated to the proper consistence.

We should have an official Fluid Extract of Wahoo as well as a solid extract; the former appears to be more used than the latter.

Extract of Jalap is reintroduced. Although dismissed in the Pharmacopœia of 1880, its use was never discontinued and, even in the compound cathartic pill, commercially it was not displaced. Extract of Juglans is now directed to be prepared with diluted alcohol and not alcohol as heretofore. It should have been dismissed for want of use.

Extract of Nux Vomica is directed to be made by extracting 1,000 grms. of the powdered drug with a mixture of alcohol 750 cc., water 250 cc., acetic acid 50 cc., continuing the extraction with a menstruum of alcohol 3 to water 1 by volume, until the nux vomica is extracted. The alcohol is recovered by distillation, and the product evaporated to 150 grms., transferred to a bottle, washing out the evaporating dish with 50 cc. warm water and add to the extract. This is now treated repeatedly with ether until it yields no more oil to the solvent. The oil recovered by the evaporation of the ether is treated with acidulated (acetic acid) water to recover any alkaloid extracted by the ether. This aqueous solution is mixed with the extract, and this is evaporated to 200 grms., the moisture and percentage of alkaloid determined and the extract dried and powdered, adding sufficient milk sugar to make the finished product contain 15 per cent. of alkaloids. The process would be simplified and most likely cheapened if the oil were first extracted from the nux vomica by the use of benzin before extraction with alcohol. Benzin is such a poor solvent for alkaloids that the loss would hardly be appreciable, but if desirable to recover dry alkaloids extracted, the benzin residue could be treated with acidulated water, and this evaporated incorporated with the extract.

Extract of Opium is likewise made in the most extravagant way. With the morphine strength of opium fixed at not below 9 per cent., and that in commerce frequently 10.5 to 13 per cent., it is very easy to prepare from the gum opium a dry and powdered extract standardized to 18 per cent. morphine. Yet the Pharmacopœia directs powdered opium. I doubt if any practical pharmacist or manufacturer will dry his opium and reduce it to number 80 powder before treating same for extract.

Extract of Uva Ursi is a new addition, and we presume that it must be used. We had expected to find both a solid and a Fluid

Extract of Sumbul; both of these appear to be growing in favor, but neither was introduced.

Eighty-eight fluid extracts are official, and there are but two or three that should be dismissed, namely, those of kousso, menispermum and savine. Of the latter, we are told on p. 165, that an official preparation is Ceratum Sabinæ, yet this has been dismissed. There are some notable changes in the menstruums directed. Some of these changes are good, but others are questionable. The menstruum for both the extract and the Fluid Extract of Aconite, has been alcohol. It is now directed only for the former, for the fluid extract a mixture of 3 volumes alcohol and 1 volume water is directed. For arnica root, diluted alcohol has been ordered in the past. It is now retained for the extract, but the fluid extract is directed to be made with 3 volumes alcohol, 1 volume water. Diluted alcohol has always been conceded to be the best menstruum for both arnica root and flowers, and the reason for the change is not apparent.

The menstruum for Fluid Extract of Belladonna root is changed from alcohol to alcohol 4 vols., water 1, and for Buchu alcohol is directed instead of alcohol 2 parts, water 1 part, of 1880. For Fluid Extract of Calumba, 3 vols. of alcohol and 1 vol. water displaces diluted alcohol; a commendable change. The alcoholic strength of the menstruum is increased also in Fluid Extract of Chirata, and it is to be observed that glycerin has been omitted in this and in the fluid extracts of chimaphila, leptandra, matico and sarsaparilla, but has been added in fluid extracts of chestnut leaves, hamamelis and hydrastis.

In the Pharmacopœia of 1880, Fluid Extract of Cypripedium was directed to be prepared with alcohol; that of 1890, directs diluted alcohol, a menstruum the same as used for fluid extract of valerian, 3 vols. alcohol, 1 vol. water, would have been better. In Extract of Conium, and in fluid extracts of conium and ergot, acetic acid is directed in place of the hydrochloric acid, 1880.

The U. S. P., 1880, unsatisfactory formula for Fluid Extract of Ipecac, is dismissed and a menstruum of 3 vols. alcohol to 1 vol. water directed, this being one of the suggestions of Mr. A. Robbins that has been adopted.

Fluid Extract of Malt disappears entirely from the Pharmacopœia, but not from use. An official fluid extract with fixed diastasic

value should have been introduced. Then, perhaps, we would have gradually stopped handling brown stout, porter and beer under the labels of Tom, Dick and Harry's extract of malt. It should be a medicinal product, not a beverage.

Fluid Extract of *Nux Vomica*, 1890, is essentially the saturated tincture suggested by Lyons in 1885. The suggestion of Maisch to reduce the alcohol to 70 per cent. by volume, as extracting less oil, is practically adopted in the menstruum of 3 vols. of alcohol and one volume water directed. The process of the Pharmacopœia is wasteful of alcohol, as it directs the extraction of the drug and subsequently by distillation to recover the alcohol and evaporate the residue to a definite weight, of which 4 grms. are assayed from the alkaloids calculated in the entire extract; a fluid extract is made, by dilution with alcohol and water, of such a strength that 100 cc contains 1.5 per cent. of total alkaloids. Distillation, necessarily, causes some loss of alcohol. It is to be observed that the fluid extract is of such a strength that if 10 grms. of the solid extract be dissolved in a sufficient quantity of the menstruum to yield 100 cc. the product is identical in strength with the official process fluid extract. As the solution of the extract has been adopted for tincture, why not adopt same for fluid extract also? or still better, as the fluid extract is only a multiple of the solid, why not omit the former?

The official Fluid Extract of *Phytolacca* is made from the poke root and not from *phytolacca* fruit, as we are informed on p. 299.

The formula for Fluid Extract of Wild Cherry shows a decided change both in method of manipulation and in alcoholic strength of the menstruum.

In Fluid Extract of *Sanguinaria* the use of acetic acid is a decided improvement which should have been extended also to the Fluid Extract of Squill.

[To be continued.]

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## MACASSAR OIL.

BY ROBERT GLENK.

The true macassar oil, prepared from the seeds of *Schleichera Trijuga*, *Willd.*, one of the East Indian Sapindaceæ, has a great reputation in its native country as a stimulating application to promote the growth of the hair and also as a remedy in skin diseases, especially eczema.



It is obtained either by expression or by boiling the bruised seeds in water and skimming off the oil which rises to the surface.

It has in former years been imported into this country ; latterly, however, a product under the name of macassar oil but which in reality was mainly composed of cocoanut oil in which the blossoms of Ylang Ylang, *Cananga odorata*, or of the false Ylang Ylang, *Michelia champaca*, N. O. Magnoliaceæ, have been digested, began to make its appearance on the market and took the place of the former. Now, mostly domestic oils under the same name, suitably perfumed and frequently colored red with alkanet, have entirely replaced the natural product.

The writer recently received a small sample of the true macassar oil from Mirzapoor, Hindoostan. At the ordinary temperature it is semi-solid, of a yellowish white appearance and has a weak odor of bitter almonds. It is said to contain hydrocyanic acid and it is not unlikely that in the stimulating properties of this constituent the cause of the ascribed beneficial action of the oil may reside.

It has a mildly acrid taste, probably due to partial rancidity and an acid reaction to litmus paper. It is completely liquefied at 82° F. (28° C.) and congeals near 50° F. (10° C.) The oil is readily saponified by sodium hydrate even at a low temperature, the soap being white and hard. With nitrous acid it assumes an orange red color and becomes viscid but does not seem to solidify. On adding 5 drops of the oil to 20 drops of concentrated sulphuric acid, it acquires a reddish brown color. The oil is freely soluble in chloroform, ether, bisulphide of carbon, benzol, benzine and the fixed and volatile oils, but only slightly soluble in alcohol. It has a specific gravity of 0.942.

An excellent formula for preparing a so-called macassar oil for the hair and which has given great satisfaction to those who have used it, is the following :

R

Castor Oil, . . . . .	16 f oz.
Alcohol, . . . . .	3 f oz.
Oil of Nutmeg, . . . . .	30 m
Oil of Rosemary, . . . . .	10 m
Oil of Sweet Marjoram, . . . . .	10 m
Oil of Neroli, . . . . .	10 m
Oil of Rose, . . . . .	20 m
Tincture of Musk, . . . . .	1 f ʒ
Alkanet, . . . . .	sufficient to color

*Macassar Pomade*, made by the following formula, also makes an excellent preparation :

R

Castor Oil, . . . . .	10 oz. weight
Suet, . . . . .	2 oz.
Spermaceti, . . . . .	1 oz.
Oil of Nutmegs, . . . . .	$\frac{1}{2}$ f 3
Oil of Sweet Marjoram, . . . . .	$\frac{1}{2}$ f 3
Oil of Rosemary, . . . . .	$\frac{1}{2}$ f 3
Oil of Rose, . . . . .	15 m
Oil of Rose Geranium, . . . . .	10 m
Alkanet root, . . . . .	sufficient to color

Melt the spermaceti and suet adding the castor oil previously colored by digesting with alkanet, and lastly add when nearly cold the perfumes, which in this case are also the medicaments.

## LEAVES FROM A SANSKRIT PHARMACOPŒIA.<sup>1</sup>

BY THOMAS STEPHENSON, F.C.S., Pharmaceutical Chemist, Bombay.

The methods of medical treatment adopted by the "medicine men" of uncivilized nations have always a peculiar interest to those of the medical and pharmaceutical professions. It is true that little, if any, material benefit can accrue to the members of these professions by such study, and no pharmacist can hope to make his fortune any more quickly because he is well acquainted with the methods of the aborigines of his own or any other country. But, as an intellectual pleasure, the inquiry into such matters will fully repay itself to anyone who has sufficient knowledge to appreciate it, and such knowledge is possessed in the best degree by physicians and pharmacists only. I feel that these few apologetic remarks are necessary in these practical times, as I do not wish to be assailed with the perpetual *cui bono* (?) complaint, which is always levelled at those who do not make money the direct or indirect object of their leisure time researches.

Some time ago it was my good fortune to make the acquaintance of a high-caste Hindu gentleman in this city, whose family had for generations back practised as "hakims," or native doctors, and in whose possession were a number of very ancient Sanskrit manuscript works on medical subjects. One of these he was engaged

<sup>1</sup> Reprinted from Pharm. Journ. Trans., August 26, p. 161.

translating into Guzerati, and, in return for certain favors received, he showed me his translation, some of the more interesting parts of which I was able, with his assistance and that of a dictionary, to further translate into English. The greatest difficulty that stood in the way was that his knowledge was not sufficient to bring the names of diseases or drugs any nearer than Guzerati. However, he was able to give me a full description of the symptoms of the diseases and furnish me with specimens of most of the drugs, with the result that in nearly every case I was able to find the English synonym.

The manuscript in question appears to be arranged in a very unsystematic manner. It is divided into a number of chapters. Starting with an article on "Fever Medicines," it goes on to treat of "Purgatives," "Female Diseases," "Pills," "Powders," "Ointments," "Aphrodisiacs," "Cough Medicines," "Oils," etc., each chapter containing a more or less lengthy list of recipes, some very sensible, others amusing in their absurdity. It would be impossible, even if desirable, to go through the whole list, so I have singled out a few of the more important groups, and from these will select the more interesting formulæ.

#### (I) OILS.

The oils used in native practice are very many, the natives of India appearing to place great faith in such forms of medication. They are generally applied externally, but are often taken in doses of 1 or 2 drops on betel leaf (*Piper betel*) for various complaints. Although the processes for the preparation of these oils are, as a rule, varied and complicated, they end in most cases with distillation, and consequently a description of this process as carried out by the natives might with advantage be given here before proceeding to describe the oils themselves.

The process of distillation is a very primitive one indeed. A quantity of the bruised drug is mixed with a certain proportion of milk; this is left to macerate for four or five days, after which it is put into a vessel made of metal or glass. This vessel, which consists of two flask-shaped portions, the necks of which fit into one another, is now closed, and the lower or empty part buried in the ground, whilst the upper part, which contains the drug, remains exposed above the earth. A fire is now kindled round the upper

part of the vessel, and the oil eventually collects in the lower part. This process, I am told, is still employed by hakims for distilling nearly all their oils, those of sandal-wood, nux vomica, jequirity, etc., being typical examples of the process.

*Oil of Sandal-wood (Chandan).*

Half a maund (14 pounds) of sandal-wood is powdered and mixed with half a pound of milk; this is left to macerate for four days, after which it is distilled in the manner described above.

The oil is employed by natives for asthma, insanity, gonorrhœa and five different forms of fever.

*Oil of Nux Vomica.—No. 1.*

Take of—

Vux vomica, . . . . .	4 parts.
Bachnag (aconite), . . . . .	4 "

Break into small pieces and add 1 pound milk daily for three days. Dry in the shade for three or four days and distil.

This is used as an aphrodisiac, being applied locally on a betel leaf.

*Oil of Nux Vomica.—No 2.*

Take of—

Nux vomica, . . . . .	10 pounds.
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Break up into small pieces and add 2 pounds milk daily for seven days. Dry in the shade for seven days, and distil as usual.

The dose of this is one to two drops, given with caution, and its uses are as follows:

Internally, one drop on betel leaf is given as an aphrodisiac, also for indigestion, diarrhœa, dysentery, hæmorrhoids, puerperal fever, hemicrania and epilepsy.

Externally it is applied for leucoderma, leprosy and leprous sores, ringworm (the round variety), piles, partial paralysis, and weakness of the sexual organs.

*Oil of Buffalo's Horn.*

Take of—

Buffalo's horn, . . . . .	2 pounds.
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Chop up and subject to dry distillation in the same manner as in the preparation of other oils.

Dose, one drop on betel leaf, given internally as a general tonic. It is also said to be a useful medicine in diabetes, as it has the power of lessening the amount of sugar in the urine.



*Oil of Red Sandal-wood.*

Take of—

Red Sandal-wood, . . . . .  $\frac{1}{2}$  maund.

Break into small pieces and add  $1\frac{1}{4}$  pound cow's milk daily for four days, shaking it up every morning. Dry in the shade for four days, and distil.

Given internally in doses of two drops on betel leaf for elephantiasis, orchitis, insanity and gonorrhœa.

*Oil of Chanoti (Guz.); Gunja (Sans); Jequrity (Eng.)*

Take of—

Red Chanoti (Jequrity), . . . . .	2 parts.
Laving (Cloves), . . . . .	1 "
Jaiphur (Nutmeg), . . . . .	5 "
Javantri (Mace), . . . . .	1 "
Nag Kesar (Cassia pods), . . . . .	1 "
Ajwain-Khorassan (Omun seeds), . . . . .	5 "
Dhatura Seeds, . . . . .	5 "

Steep the jequrity in milk for four days and dry in the shade, then add the other ingredients and distil as usual.

Dose.—Two drops, as a nerve tonic.

*Oil of Sulphur.*

Take of—

Purified Sulphur, . . . . . 6 parts.  
Juice of Calves' dung, a sufficiency.

Rub the sulphur in a mortar with sufficient juice to wet it, daily for three days; then distil. It is used externally for leucoderma, while we have the author's assurance that this marvellous "oil" will, if taken internally in doses of one drop on betel leaf, cure every disease known!

*Oil of Loban (Olibanum).*

Take of—

Loban (Olibanum), . . . . . 5 parts.  
Oil of Malka-gani (Celastrus), . . . . . 10 "

Break up the olibanum and macerate with the oil in a well-closed vessel for fifteen days. Applied for articular rheumatism.

*Oil of Hen's Eggs.*

Take six or seven eggs and boil soft; remove from the water, take off the shells, and put the yolks and whites together in a copper pot on a fire. As soon as a smell of burning is perceived, open

the cover of the pot, add 1 or 2 grains of opium, and shut again. Then remove from the fire and set aside on the ground for four or five minutes, when the oil will separate.

Oil of hen's eggs is used as a strengthening application, also as an aphrodisiac, like oil of nux vomica.

## (2) PILLS.

This form of medicament is, as with us, one of the principal forms used by these hakims. Their pills, however, are very unscientifically made, being small, irregular in size and shape, and very unequally mixed. The hakim's knowledge of pharmacy does not appear to be so advanced as his knowledge of the healing art. The following are a few of the principal pills :

### *Aqui-tund-wati Gutika*.—"Warming" Pills.

Take of—

Quicksilver, . . . . .	I part.
Sulphur, . . . . .	I "
Aconite, . . . . .	I "
Parsley seed, . . . . .	I "
Myrabolams (three varieties, <i>Hirda</i> , <i>Bira</i> and <i>Amra</i> ), of each, . . . . .	I "
Soda, . . . . .	I "
Javkhar (potas. carb.), . . . . .	I "
Chitro (plumbago) root, . . . . .	I "
Sindan (white salt), . . . . .	I "
Black salt, . . . . .	I "
Sea salt, . . . . .	I "
Ginger (dried), . . . . .	I "
Long pepper, . . . . .	I "
Nux vomica, . . . . .	½ "
Cummin seed, . . . . .	I "

Powder, mix, mass with lemon juice, and divide into pills of about 2 grains each. Such pills are given as a remedy for fever, jaundice, indigestion and loss of appetite.

### *Ashwa-chori Gutika*.—"Horse-power" Pills.

Contain quicksilver, sulphur, aconite, dried ginger, long pepper, myrabolams (three kinds), *Tankalkhar* (borax), *Nipala* (croton) and *Harya* (orpiment).

Make into a powder, grinding along with the juice of *Jalbhanga* for thirty-six hours, and divide into pills the size of *chanoti* (jequirity) seeds.

These pills are said to cure the following diseases: Dropsy, epi-

lepsy, eighteen varieties of fever, dysentery, cough, asthma, children's cough, pleurisy, jaundice, cramp, stoppage of urine, ague, rheumatism, indigestion, worms, piles, leucorrhœa, gonorrhœa, gleet and diabetes. Rubbed up with sweet oil and applied, they are recommended for hemicrania, while rubbed up with juice of *chitro* root and taken internally they are looked upon as a specific for consumption.

*Atisar Gutika*.—Diarrhœa and Dysentery Pills.

Composed of—

Opium, . . . . .	½ part.
Catechu, . . . . .	I “
Gapan (sulphate of lime), . . . . .	I “
Hing juice (asafoetida), . . . . .	¼ “

Made into 2-grain pills. Dose, two pills twice a day. This formula is one of the few grains of wheat among the chaff.

*Ichabedi Gutika*.—Purgative Pills.

These are composed of—

Mercury (metal), . . . . .	I part.
Sulphur, . . . . .	I “
Borax, . . . . .	I “
Croton, . . . . .	½ “
Ginger, . . . . .	I “
Harda (myrabolams), . . . . .	I “

Mixed and made into small pills of about 2 grains each.

*Madan-Ka-ameshwar Gutika*.—“Passion-controlling,” or Aphrodisiac Pills.

These contain—

Camphor, . . . . .	I part.
Ginger, . . . . .	I “
Red oxide of mercury, . . . . .	I “
Musk, . . . . .	½ “
Opium, . . . . .	½ “
Mace, . . . . .	I “
Nutmeg, . . . . .	I “
Pellitory (akalkaro), . . . . .	I “
Cloves, . . . . .	I “
Talc (abrak), . . . . .	I “

Made into pills of 3 grains each, one for a dose.

*Vijai Gutika*.—“Success” Pills.

Contain—

Chini-Ka-bulla (China cubebs), . . . . .	I part.
Akalkaro (pellitory), . . . . .	I “
Kavcha (cowhage), . . . . .	I “

Mal-Ka-gani (celastrus seeds), . . . . .	I part.
Laving (cloves), . . . . .	I "
Jaiphur (nutmeg), . . . . .	I "
Kesar (safflower), . . . . .	¼ "
Khora-sa-min-ajmo (Niger seed), . . . . .	I "
Hinglo (cinnabar), . . . . .	⅛ "
Mastaki (mastic), . . . . .	I "
Chota Gokhru (tribulus terrestris), . . . . .	I "

Made into small pills of 2 or 3 grains. Dose, one twice a day with milk, for spermatorrhœa.

### (3) POWDERS.

This class of medicines is divided into two sub-classes, viz: *Churān*, which contain only vegetable drugs, and *Ras*, which contain chemicals only, or at least as the principal ingredients. A few examples of the latter must suffice.

#### *Powder for Cough.*

Contains—

Sanchikhar (black salt), . . . . .	I part.
Sindankhar (table salt), . . . . .	I "
Dhatura seed, . . . . .	¼ "

Calcine together in an earthen pot. Dose, about 4 grains with butter.

#### *Gaji-Keseri-Ras*.—"Elephant and Lion" Powder.

This is a cure for paralysis and allied complaints, for which it is given in doses of about 2 grains with sugar. It consists of mercury, sulphur, garlic (*Lasan*), lime (*Chunam*), ammonia, alum (*Fatki*), long pepper (*Pipar*), borax (*Tankalkhar*), barilla (*Sagikhar*), common salt (*Lohnkhar*), arsenious acid (*Somul*), five varieties of rock salt in equal quantities, ginger, pepper, *Silagit*, plumbago root (*Chitrak*), aconite (*Bachnag*), cinnabar (*Hinglo*), orpiment (*Harthal*), and realgar (*Mansir*).

### (4) OINTMENTS (*Malam*).

One example of these will suffice, as they present no peculiarity.

#### *Ointment for Wounds and Boils.*

Contains—

Mercury, . . . . .	4 parts.
Bhudaism (litharge), . . . . .	4 "
Murthu-thu (cupri sulph.), . . . . .	4 "
Catechu, . . . . .	5 "



Resin, . . . . .	: 10 parts.
Wax, . . . . .	10 "
Chikani-supari (a kind of betel), . . . . .	5 "
Red lead, . . . . .	4 "
Sweet oil, . . . . .	10 "

Mix the oil with the wax and resin, and rub up with the powders, previously mixed with the mercury.

#### (5) VARIOUS CURES.

*Scorpion Bites.*—Take of—Pure sulphur, tamarind fruit, nutmeg, and opium, equal parts. Make into a paste with water and apply, keeping it warm by holding the part over a fire. This preparation is said to effect an absolute cure in ten minutes.

*Snake Bites.*—Three internal remedies for this are mentioned in the work in question :

*Prean-Mool* (root of?) rubbed up in rice water may be given every half hour; or the juice of *Gallo* (*Tinospora cordifolia*?) given at similar intervals; or, again, half hourly doses of *Indra varani* (colocynth) root rubbed up in whey are said to effect a cure.

*Rat Bites.*—A mixture of *Bhudaism* (litharge), *Dirwenchi* (rhubarb), and *Dharam* (pomegranate rind) is to be rubbed with water and applied on cotton.

*Swelling of the Neck.*—This is a complaint from which many natives suffer, and no fewer than five rather curious remedies are given in this book. They are as follows :

(1) *Sarpankha* root mixed with cow's urine, to be applied by rubbing.

(2) Black serpent's bones strung together and worn round the neck as a necklace. My Hindu friend informed me in perfect good faith that this was really a marvellous remedy, his father having cured many patients by no other treatment than this. Such a statement sounds amusing to our ears, but after all may not our modern teething necklace and electric belts be only a development of this ancient method of treatment? Necklaces of serpent's bones are very costly; my friend told me that in his father's possession had cost about eighty rupees.

(3) Mango seeds and horse's hoof parings are to be burnt together in a pot, mixed with butter, and applied.

(4) Camel's bones and buffalo's horns in powder are to be mixed with sweet oil (in which the flowers of *Canna indica* have previously

been boiled); and applied to the affected part. This, next to the serpent's-bone necklace, is the favorite treatment for the complaint.

(5) *Akra* flowers (*Hibiscus esculentus*) are to be heated in a closed pot and applied with *ghee* (clarified butter) to the affected part.

The book under review contains many more items, both interesting and amusing, but space forbids more being detailed at present. Many of the remedies mentioned appear absurd to our eyes, but it must be remembered that these remedies are all prepared and administered by the hakim himself, and in many cases simply act as a mask or blind while the patient is being subjected to rigorous hygienic treatment, otherwise it would be difficult to account for the many wonderful and authentic cures wrought by the native medicine men of this and similar countries.

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### NOTE ON EASTON'S SYRUP.<sup>1</sup>

BY R. WRIGHT, Pharmaceutical Chemist.

The original formula for this syrup, as published by Dr. Aitken, in his "Science and Practice of Medicine," included (1) the preparation of ferrous phosphate by precipitating a solution of ferrous sulphate with an excess of sodium phosphate, (2) the preparation of quinine hydrate by treating an acid solution of the sulphate with a slight excess of ammonia, and (3) the solution of the well-washed precipitates, together with a fixed quantity of strychnine, in dilute phosphoric acid; the process being completed by the addition of sugar, which was dissolved in the solution without the employment of heat.

As originally devised, the syrup was intended to contain the equivalent of 1 grain quinine sulphate,  $\frac{1}{8}\frac{1}{2}$  grain strychnine (alkaloid), and 1 grain hydrous ferrous phosphate in each fluid drachm.

The process published by Dr. Aitken was faulty in more than one respect, and although, judging from the quantities given in the formula, the evident intention was to produce 24 fluid ounces of syrup, the wording of the recipe was so vague and indefinite, that in the hands of different operators it might yield, as shown by P. W. Squire (*Chemist and Druggist*, vol. xlii, 795), 25, 29 or 31 fluid ounces.

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<sup>1</sup> Condensed from Pharm. Jour. Trans., Sept. 2, 1893, p. 191.

Taking into account the indefiniteness of the original recipe and the susceptibility of the ingredients to undergo physical and chemical changes, it is not to be wondered that the pharmaceutical mind has been greatly exercised over this compound, with the consequent result that numerous suggestions for its improvement have been made.

A careful review of the whole subject has led me to the following conclusions :

- (1) That the ferrous phosphate is best prepared by the direct action of phosphoric acid upon metallic iron.
- (2) That the employment of the official *syrupus ferri phosphatis* in the process for making this syrup should be discontinued.
- (3) That the quantity of sugar should be reduced by about 10 per cent., as suggested by Martindale and Clague.

The subjoined formulæ is drawn up in accordance with the above conclusions, and is submitted to the consideration of this Conference, and especially of the members of the Formulary Committee, in the hope that it may be found more satisfactory than existing formulæ :

Take of—

Iron wire, free from oxide, . . . . .	75 grains.
Concentrated phosphoric acid, sp. gr. 1.5, . . . . .	11 fl. drachms.
Strychnine in powder, . . . . .	5 grains.
Phosphate of quinine, . . . . .	120 grains.
Simple syrup, . . . . .	13 fl. ounces.
Distilled water, a sufficient quantity.	

Place the iron wire and the phosphoric acid previously diluted with an equal volume of distilled water, in a small flask, plug the neck with cotton-wool, and heat gently until the reaction is complete; then add the strychnine and the phosphate of quinine, and shake till dissolved; filter the solution into the cold syrup, wash the filter and add as much more distilled water as may be required to make the volume of syrup up to one pint.

The above preparation will contain 1 grain phosphate of iron,  $\frac{3}{4}$  grain phosphate of quinine,  $\frac{1}{32}$  grain strychnine in each fluid drachm.

OILS OF ANISE.<sup>1</sup>

BY. P. W. SQUIRE, F.L.S.

As supplementary to the paper read by Mr. John C. Umney (Am. Journ. Pharm., 1889, p. 255), and the ensuing discussion, the following rough notes, arising out of some experiments in connection with a new edition of the "Companion to the B.P.," may help towards a more accurate knowledge of these oils.

It may be premises that the oil of ordinary anise (*Pimpinella Anisum*) and of star anise (*Illicium anisatum*), when freshly distilled, consists mainly of anethol, a stearopten melting at 70° F., with varying quantities of a terpene. By exposure to air, anethol is gradually converted into anisic aldehyde, with probably some resinification of the terpene, this oxidation being accompanied by certain changes in the physical characters of the oil.

In connection with the solidification and liquefaction of anise oil, there are *three* temperatures to be noted:

(A.) "Abnormal solidifying point," or the temperature at which the oil when cooled first shows indication of freezing. This depends so completely upon conditions of cooling that no figure can be attached to it. Two experiments with the same sample may show a difference of over 20° F., this being true of either variety of oil.

(B.) "Normal solidifying point." This is defined by Mr. Umney as "the temperature to which the thermometer immediately rises on solidification taking place." For two reasons this point is somewhat indefinite. (1) the rise in temperature is more or less gradual, and although much more rapid at first than at the finish, the thermometer is never steady at any one point, and the more solid the frozen mass, the slower the rise in the thermometer; (2) the point to which the temperature rises, *rapidly* depends to some extent upon how far the oil has previously been cooled. Supposing one considers the normal solidifying point to be reached, when the rise of temperature is only one degree in half a minute, a difference of 20° in the *abnormal* may make a difference of 3° to 6° in the *normal* solidifying point.

(C.) "Melting point." The temperature at which a sample after freezing becomes completely liquid is the only *constant* factor in connection with the congelation and liquefaction of anise oils. It is

<sup>1</sup> Reprint from Pharm. Journ. and Trans., p. 104, Aug. 5, 1893.



a few degrees higher than the normal solidifying point, and in recent samples may vary from  $60^{\circ}$  to  $68^{\circ}$  F.

It must be noted, however, that the congealing point, in whatever way taken, is not of much value either as a character or test, except for fresh oil, as it becomes lower on keeping at a rate differing in each sample. I have had specimens, the melting point of which after two years had only been reduced  $5^{\circ}$  to  $7^{\circ}$  F., while other (both from ordinary and star anise), after a similar interval, and kept under roughly similar conditions, could not be made to freeze at  $10^{\circ}$  F. Whether these differences are due to the larger proportion of the anise terpene accelerating the oxidation of the anethol I have not yet determined experimentally.

The specific gravity depends, (1) on the proportion of terpene .870, then 10.20, and 25 per cent. of terpene will give specific gravities or .996, .982, and .975, respectively, which covers the maximum and minimum of fresh oils as generally met with; (2) on the oxidation of the anethol into anisic aldehyde, the published sp. gr. of which is 1.100. Of the oils examined, the highest specific gravity which we have noted is 1.105, being the last few ounces of a bottle of English-distilled oil from ordinary anise, so that according to the age of the oil we may have any sp. gr. between .975 and 1.100.

The polarizing rotation of anise oils in a 200 mm. tube has in the samples examined varied between  $+2\frac{1}{2}^{\circ}$  and  $-4\frac{1}{2}^{\circ}$ . It is usually a small minus quantity; appears to have no connection with the source of the oil; does not alter in a year; and is greater in the liquid portion of the oil than in the solid. Pure anethol has probably no rotation whatever.

Anethol requires for solution three parts of rectified spirit and 200 parts of proof spirit. As oxidation proceeds, the solubility increases, till the oil mixes with rectified spirit in all proportions and dissolves in about 100 parts of proof spirit. Star anise oil, however, appears to contain a small quantity of some constituent insoluble in proof spirit, as even after warming the solution is slightly turbid.

Eykman's test is understood by Mr. Umney (*Ph. J.*, [3], xix, 649) to be "a saturated solution of hydrochloric acid gas in absolute alcohol," and is stated by him to give with "pimpinella" oil a manganese-pink color, and with star anise oil a yellowish-brown color.

In the 1890 edition of the "Companion," however, we mentioned

that this test did not appear to be very definite, as "of five samples tested three (*pimpinella*) gave a blue color; one (*illicium*) gave a pink; one (*illicium*) gave a yellow color," while the result of more recent experiments confirms the observation that with "*pimpinella*" oil the color given is a rich blue, changing into a more or less brownish-red. Star anise oils give a yellow or brownish-yellow color, usually but not always, changing to a rich red. The test therefore depends not upon the difference between a pink and a yellowish-brown color, but upon the production or non-production of a deep blue color, on addition of the reagent, which is best used in considerable excess. I would venture to suggest that the different results obtained by Mr. Umney were due to the use of an alcohol not sufficiently saturated with hydrochloric acid. The reagent used above had a sp. gr. of .970 and contained 27 per cent. by weight of hydrochloric acid gas. With an acid of half that strength, the characteristic blue color is not produced.

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## THE CAUSE OF THE RED COLORATION OF PHENOL.<sup>1</sup>

BY CHARLES A. KOHN, Ph.D., B.Sc.,

Lecturer on Organic Chemistry, University College, Liverpool.

Since alkalis (especially ammonia), metallic salts, and oxidizing agents play an important part in the turning red of phenol, their separate and combined actions on specially purified phenol, has been investigated. The purest commercial phenol, known as "absolute phenol," was used in a portion of the experiments; in the remainder, a specially purified sample, kindly prepared by C. Lowe, Esq., of Manchester.

This phenol was first purified by repeated distillation from glass vessels, the first and last portions of each distillate being rejected. The distilled product was then tested with hydrogen peroxide, ammonia, caustic potash, iron and copper salts, after one, six, nine and fifteen distillations, respectively.

The tests were carried out by placing 2-3 cc. of the melted phenol in a test-tube and adding one or two drops of the reagent or mixtures of the reagents. The reagents were employed in various strengths.

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<sup>1</sup> Abstract of a paper read before the British Association (Section B), Nottingham Meeting, 1893, through Chem. News, 1893, p. 163.

Under all conditions a coloration was found to result, even with the fifteen times distilled product, whilst comparative tests showed that no further purification had been effected after the second distillation. Ammonia in concentrated solution produces a deep blue coloration, identical with Phipson's "phenol blue," and probably the same product as phenol-quinone-imide. The formation of this color has long been known, and seems to have been quite overlooked by Fabini in his statement that, in addition to ammonia, metallic salts and hydrogen peroxide are also necessary for a coloration to be formed. Very dilute ammonia, in common with hydrogen peroxide, caustic potash, hydrogen peroxide in presence of ammonia, or of caustic alkali, metals, or metallic salts, with or without hydrogen peroxide, produces a reddish coloration. The intensity and tint of the colors produced by these different reagents vary considerably, but in most instances it inclines to red—the color usually formed in commercial phenol. Whilst it is not likely that these colors are identical, it is probable that they are closely allied products, and the conditions of their formation point to their being oxidation products of phenol. Gentle heating in all cases aids the formation of these colorations.

The phenol, both after nine and after fifteen distillations, was carefully tested for metallic impurities and was found to be quite free from the same. Further, in order to test whether iron and copper salts were readily carried over by phenol when distilled, the product was distilled after the addition of these metals and of their salts, with the result that after two careful distillations from glass vessels the distillate was found quite free from metallic contamination.

That *pure* phenol behaves as described with the above reagents was confirmed by applying the same tests to phenol purified by sublimation, and also to that obtained by the saponification and subsequent decomposition of gaultheria oil.

Of greater importance than the action of these various reagents upon purified phenol, is the fact that the pure product obtained by each of the above processes does of itself become colored when exposed to ordinary moist air. The coloration, which gradually deepens from pale pink or brown to red, is always accompanied by the absorption of moisture, and the reddening is especially conspicuous in the partially liquefied parts of the sample. This coloration does

not take place in the dark, nor under red glass; it is the work of the more refrangible rays of light only.

As has often been observed, sublimed phenol does not redden as rapidly as the distilled product; in fact, according to Bidet, it does not color at all on exposure when thus purified. This, however, is not the case, the sublimed product becomes colored quite as quickly as distilled phenol when in solution, and that it is slower in turning pink when in the solid state is due to the fact that the crystals obtained by sublimation are less hygroscopic than the distilled product. In absence of moisture, under all conditions, no coloration ensues; hence the appearance of the color in those portions of the sample which have become partially liquefied. Phenol placed *in vacuo* can be exposed to light for months without becoming red, nor does it color either in presence of moisture when air is absent, or in presence of air when perfectly dry. Both air and moisture are necessary for the coloration to take place.

The similarity between the colored products formed by the action of moist air and phenol and that produced by hydrogen peroxide naturally led one to look to the latter as the real factor in the oxidation. That such is the case has been conclusively shown by Dr. A. Richardson, who has succeeded in detecting the presence of hydrogen peroxide in reddened phenol, both by the chromic acid and by the titanous acid test.

This same color is produced, together with a complexity of other substances, when phenol is electrolyzed in acid solution. The nature of the colored product formed is still under investigation, and not until the coloring-matter itself is more completely studied can any conclusion be drawn as to the course of the oxidation.

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## AFRICAN COPAIBA.<sup>1</sup>

BY JOHN C. UMNEY, F.C.S.

I have already called attention to the principal general characters of this oleoresin as imported from the Niger basin in a preliminary note (A. J. P., 1892, p. 33), and compared two samples from that source with specimens of South American origin. The results may be briefly summarized thus:

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<sup>1</sup> Read at British Pharmaceutical Conference, Nottingham, August 16, 1893, through Pharm. Jour. Trans., September 9, 1893, p. 215.



*Comparison of Essential Oils.*

Properties and Tests.	African.	Maracaibo.	Para.
Percentage of oil.	39 per cent.	42 per cent.	{ A, 80.2 per cent. B, 64.3 per cent.
Specific gravity.	0.9180.	0.9052.	0.9060.
Rotatory power.	+ 20° 42'.	— 34° 18'.	— 28° 55'.
Solubility at 15° in absolute alcohol.	not soluble 1 in 50.	1 in 1.	1 in 1.
In petroleum ether.	1 in 1.	1 in 1.	1 in 1.
In ether '720.	1 in 3.	1 in 3.	1 in 2½.
In ether '735.	1 in 3.	1 in 3.	1 in 2½.
In rectified spirit.	not soluble 1 in 50.	1 in 19.	not soluble 1 in 20.
In glacial acetic acid.	1 in 7.	1 in 5.	1 in 3½.
Range of boiling point.	260–273° C.	245–255° C.	252–260° C.
Behavior to dry hydrochloric acid gas in freezing mixture.	Becomes wine-red, turbid, deposits after a time, but no crystals.	Becomes wine-red, turbid, deposits after a time, but no crystals.	Becomes wine-red, turbid, deposits after a time, but no crystals.
Digested for 6 hours with metallic sodium and fractionated.	Blue oil, permanent.	Blue fluorescence only.	262° C., falling to 230° C., green oil.
Behavior to chloroformic gold chloride solution with 1 per cent. absolute alcohol.	Reduces immediately, deposits metallic gold.	Becomes green, no deposit after 1 hour.	Becomes green only no deposit after 1 hour.
Iodine absorption in 16 hours.	251.8.	257.9.	233.
Distilled with bichromate of potash and sulphuric acid.	Bluish-green, 265–267° C.	Bluish oil, rapidly becoming brown (257° C. falling).	Blue color fades on standing 1 hour exposed to air (252° C. falling).

The African oleoresin is slightly fluorescent, possesses an aromatic piperaceous smell, and has a specific gravity of 0.985 to 1.000 at 15° C. It deposits crystals on standing, and yields on distillation with steam about 40 per cent. of volatile oil.

The oleoresin does not lose its fluidity when heated in a sealed tube to 220° C., a property which distinguishes it from gurgun balsam.

The object of this additional paper is to lay before you the results of a more extended examination of the volatile oil and crystalline and other resins briefly mentioned in that note, and a comparison of them with those obtained from South American copaiba.

*Volatile Oil.*

The average yield of volatile oil obtained by distillation with steam from the samples of African copaiba examined was 39 per cent. The oil was of a pale yellow color, had a specific gravity of 0.9185 at 16° C., and a notation of + 20° 42 with a tube 20 cm. long at 16° C. It is soluble in its own weight of petroleum ether, in 3 parts of ether, 7 of glacial acetic acid, but is not completely soluble in 50 parts of rectified spirit or absolute alcohol. One hun-

dred grammes of the oil was dried over chloride of calcium, and fractionally distilled with the following result :

Below 260° C., . . . . .	Nil.
260-265° C., . . . . .	62.3 grammes.
265-267° C., . . . . .	9.4    "
267-270° C., . . . . .	7.4    "
270-273° C., . . . . .	5.0    "
Residue, . . . . .	15.9   "

The unsuccessful attempts to obtain a crystalline hydrochloride by passing dry hydrochloric acid gas through the oil have been recorded in the previous note, the oil only becoming wine-red and letting fall a non-crystalline deposit. No crystalline product could be obtained, moreover, by passing chlorine through the oil immersed in a freezing mixture.

The dry oil yielded on fractionation over metallic sodium a blue oil boiling at 260°, and agreeing with that obtained by Brix (*Fahresbericht*, 1881, p. 1028) from the Maracaibo variety. It may be noted that this blue oil can only be obtained from the perfectly dry oil, several attempts on the moist oil resulting in failure.

Distilled with bichromate of potash and sulphuric acid a bluish-green oil is obtained at 265°, the thermometer falling rapidly.

The original oil reduces rapidly and powerfully a solution of gold chloride in chloroform containing 1 per cent. of absolute alcohol, and the "iodine absorption" in sixteen hours is 251.8.

The fraction boiling at 264° C. was heated for twenty-four hours in the manner described by Wallach (*Abst. "Sesquiterpenes," Pharm. Journ.*, November 12, p. 383) with glacial acetic acid, sulphuric acid and water, and the dark resulting liquid subsequently distilled in a current of steam. From no fraction, however, on cooling could a crystalline hydrate be obtained. From the fraction of South American copaiba oil, boiling at about 260°, a small quantity of a crystalline hydrate was obtained, agreeing in properties with the sesquiterpene hydrate obtained by the previously mentioned worker. No crystalline halogen compounds could be obtained direct from that fraction of the oil.

To determine whether any similarity in physiological action exists between the oils from the African oleoresin and those hitherto imported from South America I have submitted them to E. Hurry Fenwick, Esq., F.R.C.S., for therapeutic experiments.

This eminent specialist has kindly placed at my service his reports<sup>1</sup> on picked cases which he has treated, with the oil in capsules each containing 10 minims. He briefly summarizes his remarks thus: "The oil possesses undoubted therapeutic powers, all the patients, with one exception, acknowledging much benefit from its exhibition. I am told by patients that it is less nauseous to take, repeats less, but is less potent in its effects than the copaiba oil at present in the market (South American). I have used it in prostatic inflammation, fresh and chronic urethritis, stricture and pyelitis."

Reference has been made in the previous communication to the crystalline substance deposited from the crude oleoresin, which by recrystallization from petroleum ether was obtained almost colorless. The crystals are distinctly acid to litmus, electrical by friction and melt at 124° C. The properties are similar in many respects to those possessed by the oxycopaivic acid, separated by Fehling from a deposit from the Para variety of the oleoresin.

From these experiments it will be seen that in many respects the so-called African copaiba corresponds with that imported from South America, and points to the possibility of its being derived from one of the *Copaifera* which are known to exist in tropical Africa.

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## ABSTRACTS FROM THE FRENCH JOURNALS.

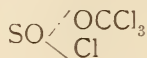
TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

*The action of nitrohydrochloric acid on carbon bisulphide* has been studied by Schlagdenhauffen and Bloch (*Four. de Pharm. et de Chim.*, September, 1893, p. 241). A mixture of carbon bisulphide with an excess of nitrohydrochloric acid was distilled, when white crystals were found to have deposited on the neck of the apparatus, becoming very abundant upon several redistillations. These crystals were very volatile, and upon increasing the heat, passed to the receiver, which was cooled with a freezing mixture. The remaining acid liquid yielded an abundant precipitate to barium chloride, while the product of the distillation, deprived of acid by washing with water, deposited upon spontaneous evaporation, white, volatile crystals, possessing an irritating, intolerable odor; they sublimed slowly

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<sup>1</sup> I regret that the details of the reports preclude their publication in a pharmaceutical paper.

at ordinary temperature, fused at  $135^{\circ}$  C., dissolved in nearly all ordinary solvents, particularly in carbon bisulphide, but were insoluble in water, and were precipitated from their solution in absolute alcohol by an excess of water. These properties point to the identity of the crystals with the *trichlormethylsulphurous chloride*, obtained by Kolbe from the action of manganese dioxide and hydrochloric acid on carbon bisulphide, and possessing the formula



*Action of aldehydes on polyvalent phenols, aromatic acetals.*—From a thesis presented by M. Causse for obtaining the diploma of a pharmacist of the first class, the *Jour. de Pharm. et de Chim* (October, 1893, p. 319) abstracts the following: By the action of aldehydes on phenol either diluted or in acid solution, a molecular combination of a phenol ether and the aldehyde employed is formed; and to designate the combinations the author uses the generic name *acetals*. The diatomic resorcin phenol of the *meta* series forms with ordinary aldehyde, ethylresorcinic acetal, in which two molecules of resorcin are combined for one of aldehyde. The same phenol acting upon chloral or upon glyoxylic acid forms one and the same acetal, glyoxylresorcinic acetal, the constitution of which resembles the preceding. One molecule of this phenol also enters into combination with pyrogallol, forming ethylpyrogallallic acetal.

*Estimation of total bromine in urine.*—A Nicolle publishes the following process, based upon Dechau's process for estimating alkaline bromides; 50 cc. urine and 2 gm. caustic potassa are mixed, and carefully incinerated. The alkali is added for the purpose of decomposing any volatile ammonium bromide, which is liable to form in the course of the operation, into ammonium and potassium bromide. The mixture is heated to dull redness, recovered with boiling water, filtered and the volume made up to about 40 cc.; 10 cc. pure sulphuric acid are now cautiously added and the whole introduced into a long-necked flask, containing 20 gm. potassium bichromate, and connected by means of a glass tube with another flask immersed in cold water, and containing 20–25 cc. of a 4 per cent. potassium iodide solution. All joints of the apparatus should be made with caoutchouc, previously boiled with caustic alkali. On heating the liquid to ebullition, bromine vapors are at



once formed, and are condensed in the other flask, displacing iodine ; the operation completed the contents are poured into a flask of 50 cc. capacity. and the volume completed with water. The iodine is estimated (and the bromine by difference) by means of sodium hyposulphite solution in presence of an equal weight of starch. Following are some of the results obtained by this process :

	Bromine.	
	Calculated.	Found.
50 cc. urine containing 0.20 gm. potassium bromide, . . . . .	0.13 gm.	0.122 gm.
50 cc. urine containing 0.50 gm. potassium bromide, . . . . .	0.33 "	0.32 "
50 cc. urine containing 0.50 gm. gallobromol or dibromogallic acid ( $C_7H_4O_5Br_2$ ), . . .	0.243 "	0.24 "

—*Four. de pharm. et de Chim.*, October, 1893, p. 298.

The comparative action of iodoform on staphylococcus and on the elements entering into the composition of blood has been investigated by Dr. E. Maurel (*Bull. Gén. de Thérap.*, September, 1893, p. 241), by (1) submitting the blood elements to the action of a staphylococcus culture on gelose ; (2) submitting the same elements to the action of iodoform ; (3) submitting staphylococcus to the action of iodoform ; and (4) allowing iodoform to act simultaneously on that micrococcus and on the blood elements. The leucocytes of human blood, absorb, at body temperature, the staphylococci of a gelose culture, but succumb to that absorption within two hours ; the blood corpuscles separate, but dissolve and disappear after fifteen hours ; and fibrin, which is at first precipitated, is redissolved after twenty-four hours. Iodoform in doses varying from 10 cgm. to 2.50 gm. per liter of blood has no toxic action on the leucocytes ; on the contrary, their activity seems to increase proportionately to the dose employed. The author found that iodoform has no apparent action on the reproductivity of staphylococcus, but lessens its *virulence* against leucocytes when blood is submitted to its presence at the same time. From these results the author draws the conclusions, that three distinct properties must be recognized in various microbes, but especially in staphylococcus, *virulence*, *reproductivity* and *survivency*, and that the efficiency of iodoform against staphylococcus, which has been demonstrated by clinical practice, is due to its double action in increasing the activity of the leucocytes, and in diminishing the virulence of the staphylococcus.

*The rapid detection of tin*, in salt solutions, even in presence of iron, copper, or other reducing substance, is effected by G. Dénigès, by means of a molybdo-sulphuric solution (molybdate of ammonium, 10 gm.; distilled water, 100 cc.; pure sulphuric acid, 100 cc.). Several drops of the suspected solution are placed on a platinum dish with one drop of sulphuric acid, and a piece of zinc is placed on the platinum in contact with the liquid; after one or two minutes the zinc is removed, the dish washed under a thin stream of water, allowed to drain, and if a metallic stain is found on the platinum, at the place of contact with the zinc, it is wetted with 4 or 5 drops of hydrochloric acid, and evaporated to complete dryness. Several drops of water are now placed on the dry residue for several minutes, and one or two drops of the liquid so obtained are added to 2 or 3 cc. of the molybdo-sulphuric solution, when an instantaneous blue coloration will show that tin is present in the solution examined.—*Bull. de la Soc. de Pharm. de Bordeaux*, September, 1893, p. 286.

*Fluid extract of digitalis* has been admitted into the Danish Pharmacopœia, which has recently made its appearance, and according to Et. Fayn (*Four. de Pharm. d'Anvers*, August, 1893, p. 298), figures for the first time in any European pharmacopœia. The Pharmacopœia directs the maceration for two hours of 1,000 p. digitalis leaves with 50 p. glycerin and 450 p. dilute alcohol, percolation with 6,000 p. dilute alcohol, and then distillation on a vapor bath, until not more than 1,000 p. remain; the extract is then diluted with 2,000 p. water, evaporated to 1,500 p., filtered and again submitted to evaporation to 500 p., to which 500 p. alcohol are added to obtain 1,000 p. by weight. The extract is of a dark green color, and yields on the addition of 50 p. water a yellowish green limpid liquid. The maximum dose is given as 0.10–0.50 gm. Unless otherwise specified by the physician, an infusion of digitalis may be dispensed by adding water to the above extract in the required proportion.

*Syrup of tolu balsam*, if kept for several months, exhibits alteration in both odor and taste. M. Ausaldy (*L'Union Pharm.*, Sept., 1893, p. 425) heats such an altered syrup to violent ebullition (above 100° C.), when a disengagement of gas takes place, more or less abundant according to the degree of alteration; upon cooling the aromatic taste, although not very pronounced, will be found to

have returned. Certain authors having suggested, that the change rarely occurs in a syrup having an acid reaction, M. Ausaldy prepared the syrup from a balsam of tolu mixture, to which 0.50 cgm. of benzoic acid, per liter of liquid had been added, and found the product to keep more than a year without change.

*Solution for making syrup of iodide of iron* is made by Roussillon, according to the following formula which he claims yields an unalterable product: A boiling solution, composed of resublimed iodine 16.40 gm., iron filings 8 gm., and distilled water 30 gm., is filtered into a flask containing 220 gm. pure neutral glycerin, the filter washed with boiling distilled water; the liquids are well mixed and subjected to a moderate heat until they measure 240 gm. The solution is then filled into well-dried bottles, which are closed, and upon cooling the stoppers are covered with paraffin—*Four. de Pharm. et de Chim.*, September, 1893, p. 243.

*Oxalic acid* has been experimented with for some time by Dr. Lardier, for the purpose of obtaining its emmenagogue effect, in the least repugnant form, as he thinks very highly of the medicament for this purpose, and finds that the result of a daily dose of 2 gm. is well characterized. As a result of his investigations he has formulated the following: Oxalic acid, 2 gm., are dissolved in 400 gm. water, and to this solution are added 40 gm. neutral glycerin, and 60 gm. syrup of orange flower.—*Rev. de Thér. Méd. Chirurg.*, September, 1893, p. 500.

*Injection of creosote-mentholated oil* against pulmonary tuberculosis, was reported by M. De la Jarrige to the Congress for Tuberculosis, held in Paris, August, 1893. The formula, which he employs is as follows: Sterilized oil, 100 gm.; creosote, 10 gm.; menthol, 5 gm., of which 30 cc. are injected directly into the trachea.

Upon the same occasion, Weill and Diamantberger reported satisfactory results from *guaiacol* injections; their formula is—Pure guaiacol, oil of sweet almonds, sterilized at 120°, of each equal parts. The injections are made with a syringe of 50 cc. capacity, commencing with one-quarter of that quantity and increasing to daily doses of one or two of the full capacity or in severe cases to even as high as eight injections per day.—*Rev. de Thér. Méd. Chirurg.*, October, 1893, p. 519.

For a menthol dentifrice, the *Ann. di Chim. e di Farm.* (through *Rép. de Pharm.*, Sept., 1893, p. 413) gives the following formula: Flowers of sulphur, 25 gm.; magnesium carbonate, 25 gm.; menthol, 1 gm.; cochineal, 50 cgm.; glycerin, a sufficient quantity.

*Solution against insect bites.*—The following formula is published by the *Jour. de Pharm. et de Chim.*: Ammonia water, 3 gm.; collo-dion, 1 gm., and salicylic acid, 10 cgm. One drop to be applied to each spot affected.

## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, PH.G.

The pepper constituent to which the sharp taste is due is the piperine; this substance is not tasteless as generally accepted, but by prolonged contact with the tongue develops the sharp taste which can be better demonstrated by tasting a piperine solution warmed to 50° C.; in the pepper fruit the piperine is dissolved in the essential oil, hence the decreased sharpness of old pepper is explainable by the resinification of the essential oil causing decreased solubility of the piperine. The essential oil has the odor of the fruit, but in alcoholic solution is free from any sharp taste. As an oxidation product of the essential oil, in part at least, is a viscid unsaponifiable oil which also dissolves piperine, but itself is free from odor and taste. In addition to these three constituents pepper contains cellulose, starch and small quantities of coloring matter.—Th. Weigle, *Pharm. Ztg.*, 1893, 584.

*Basic organic bismuth salts* can be made by taking advantage of the solubility of bismuth chloride in a 25 per cent. solution of sodium chloride or other alkaline chloride and adding the organic acid to this solution. *Basic bismuth gallate*: 100 gm. bismuth chloride are dissolved in 1,800 gm. sodium chloride solution (25 per cent.), filtered, 400 gm. gallic acid added, boiled for 20 minutes, replacing the evaporated water, and pouring into an excess of water sufficient to retain in solution the excess of gallic acid; the precipitate is washed and dried; the product contains 49.2–50 per cent. bismuth and corresponds to the formula  $C_6H_2(OH)_3COOBi(OH)_2$ .

*Basic bismuth pyrogallate*: 150 gm. pyrogallol are dissolved in 650 gm. and 316 gm. bismuth chloride are dissolved in 1,000 gm. solution of sodium chloride (25 per cent.); the filtered solutions are mixed, heated for one-half hour in a water-bath and poured into



such a volume of water (about 20 volumes) that precipitation of the basic salt commences; after some time the precipitate is collected, washed with water until the acidified washings cease to react with silver nitrate; the product, apparently, has the formula  $C_6H_3(OH)O_2(BiOH)$ .—Dr. A. Voswinkel, *Pharm. Ztg.*, 1893, 594.

*Boro-Salicylic acid solution*, containing four grams each of boric and salicylic acid in a liter, proposed by Cesaris and Carcano, has been found of such value in an Italian hospital that it completely replaced the mercuric chloride solution. The addition of the boric acid adds permanency to the salicylic acid solution; the strength of the solution can be increased so as to contain six grams salicylic acid per liter, although this solution was only occasionally used.—(*Bollet. Chim. Farm.*), *Pharm. Ztg.*, 1893, 594.

*Cocaine reaction*.—To 0.02 gm. cocaine hydrochlorate dissolved in one drop of water is added 1 cc. concentrated sulphuric acid; the colorless solution upon addition of a drop of potassium chromate or bichromate solution gives a precipitate which rapidly redissolves; upon moderate heating the yellowish red color changes to green, while stronger heating causes the escape of benzoic acid vapors. Other reducing alkaloids like morphine are distinguishable by other tests as, for example, the action of sodium hydrate which dissolves morphine but not cocaine.—Dr. Schaerges (*Schwz. Wochenschr. f. Chem. und Pharm.*), *Pharm. Ztg.*, 1893, 602.

*Cocaine salts* in aqueous solution are precipitated by borax, the precipitate dissolving upon the addition of glycerin. The explanation is that the alkaline borax precipitates the cocaine which is dissolved again when the added glycerin liberates boric acid from the borax. If the solution containing glycerin, borax and some cocaine salt be warmed, a turbidity is noticeable commencing at the top of the solution and travelling downward throughout the entire solution; during cooling the solution becomes perfectly clear again. No explanation is given for this peculiar behavior which results with solutions containing 0.1 per cent. of cocaine hydrochlorate.—M. Lewy, *Pharm. Ztg.*, 1893, 614.

*Malakin*, or salicyl-phenetidine closely related to phenacetin (acet-phenetidine) is recommended as an antipyretic, antirheumatic and antineuralgic; the single dose is one gram, the daily dose 4–6 gms. Insoluble in water, cold alcohol and alkaline carbonates, it is quite

soluble in solution of soda and in boiling alcohol. Despite the insolubility it is readily absorbed, being decomposed in the stomach into phenetidine and salicyl aldehyde; the latter is oxidized and voided as salicylic acid and can be detected in the urine twenty minutes after the introduction of the remedy.—Dr. A. Jaquet (*Korr.-Bl. f. Schwz. Aerzte*), *Pharm. Ztg.*, 1893, 615.

*Caffearine*.—A new alkaloid was isolated from coffee by Dr. P. Palladine by repeatedly boiling the raw coffee (in as fine a condition as possible) with ten times its weight of water, to which a little milk of lime was added; the decoctions are precipitated with solution of lead subacetate in slight excess, filtered, the excess of lead removed by adding sulphuric acid and the solution concentrated; should the solution show considerable color the precipitation with lead subacetate is to be repeated; the caffeine is removed by extracting with 10–12 portions of chloroform or until nothing more is removable. The solution is acidified with sulphuric acid and evaporated several times to volatilize the acetic acid, after which the aqueous solution is decolorized by animal charcoal; the caffearine is next precipitated by potassio-bismuth iodide, the precipitate carefully washed, suspended in water, and decomposed with hydrogen sulphide, the hydriodic acid neutralized with lead carbonate filtered and the precipitation with potassio-bismuth iodide, etc., repeated until the precipitate shows a beautiful crystalline appearance; after decomposing with hydrogen sulphide the solution of the hydroiodate is warmed in a water-bath with silver oxide, carefully neutralized with hydrochloric acid and the hydrochlorate allowed to crystallize. The alkaloid itself,  $C_{14}H_{16}N_2O_4$  can be obtained from the hydrochlorate by the use of silver oxide and is obtainable in crystalline needles which are acted upon by light, and are quite soluble in water and alcohol. The hydrochlorate  $C_{14}H_{16}N_2O_4 \cdot HCl + H_2O$  forms needles extremely soluble in water, also soluble in dilute alcohol, but insoluble in absolute alcohol. Caffearine differs from caffeine by being precipitable by alkaloidal reagents.—*Apotheker Ztg.*, 1893, 443.

*The detection of saccharin in presence of salicylic acid*.—The methods for isolating these two substances consist in extracting the acidulated solution with ether and evaporating; this residue will contain both saccharin and salicylic acid if they are present in the material to be investigated, and to positively identify the former has been a matter of

difficulty. A method proposed by Hairs is quite easy: The mixture obtained from the ethereal solution is dissolved in water acidulated with hydrochloric acid and the salicylic acid precipitated completely as brom-salicylic acid by adding bromine water, agitating, filtering, expelling the bromine from the filtrate by a current of air, extracting with ether and evaporating after adding a few drops of a sodium bicarbonate solution; the residue has the intense sweet taste of saccharin and after fusion with potassium hydrate will give the test for salicylic acid which has been produced in the decomposition of saccharin.—(*Fourn. d. Pharm. d' Anvers*) *Apotheker Ztg.*, 1893, 500.

*The spontaneous ignition of lupulin* is reported from Bremen. On one of the trans-atlantic steamers just about ready to sail smoke was seen to issue from a box; upon opening, to see the cause, the material, lupulin, burst into flame. The lupulin had been sent from some part of Bavaria and was to be shipped to this country. The unconsumed portion was found to be thoroughly caked, due to the presence of moisture and thus furnishes the cause of the ignition: a material, rich in oil; moisture; large quantity and considerable time of storage by which the heat generated by the slow oxidation of the oil, was so much increased that it reached the ignition temperature.—*Siidd. Apotheker Ztg.*, 1893, 466.

*Lignin color test.*—Lignin chemically belonging to the class of aldehydes led Dr. E. Nickel to test its behavior towards phenylhydrazine. The wood to be tested is moistened with an aqueous solution of phenylhydrazine hydrochlorate; the wood takes a yellow color which is intensified by the addition of dilute hydrochloric acid; in the course of an hour's standing the yellow color of some woods is changed to a pure green, others require longer standing.—*Chemiker Ztg.*, 1893, 1209.

*The detection of lead salts in drinking water* succeeds very well if manipulated as follows: One liter of the water and five cc. of glacial acetic acid are evaporated to 100 cc., filtered and 1–2 drops of a diluted hydrogen sulphide solution (1 part saturated solution with 2 parts distilled water) added; the presence of lead salts causes a brown coloration which is to be compared with the result gained with a water known to be free from lead. It is possible by this procedure to detect 0.05 mg. lead in 100 cc. water. By comparison with very dilute solutions of known strength the lead may be approximately estimated.—Prof. M. T. Lecco, *Chemiker Ztg.*, 1893, 1431.

## MINUTE OF MEETING OF MEMBERS OF THE COLLEGE.

PHILADELPHIA, September 25, 1893.

A stated meeting was held this day at 4 P.M., in the Hall, Charles Bullock presiding. Twenty-eight members were present.

Dr. A. W. Miller, Corresponding Secretary, announced the names of those who had responded to the notification of their elections as honorary and corresponding members, respectively.

Prof. Trimble reported, verbally, upon the proceedings of the Am. Pharm. Assoc., held at Chicago, referring particularly to the labors of the various sections, and the interest manifested.

Prof. Sadtler reported upon the Proceedings of the Inter. Pharm. Congress, recently assembled in Chicago; this general statement was supplemented by remarks of Prof. Remington upon the positive international character of this body, embracing from this country as well as from foreign lands representatives of all nationalities, the chief interest obviously centering in the formulation of a Universal Pharmacopœia.

Dr. A. W. Miller presented a written report of delegates to the Pan Am. Med. Congress, held recently at Washington, D. C.

The President, on behalf of the Committee on Memorials of Deceased Members, announced the death of Edward Hopper, a former member of this College, at the age of 82. Mr. Krewson announced the death of Thomas Hoskins, a graduate.

The President spoke in eulogy of the late Prof. John M. Maisch, in the following words:

"The Committee on Deceased Members have the painful duty to announce to this College the decease of our late fellow-member and Senior Professor, John M. Maisch, on the 10th of September, after prolonged suffering, from a malady which was beyond the reach of medical skill.

"I scarcely know what to say on behalf of the Committee; your own thoughts will anticipate any words of mine.

"There are occasions in the history of institutions, as well as in the domestic circle, when death spreads a dark mantle over our thoughts of temporal affairs, and a heavy cloud obscures the future, while we look back upon the past, illuminated by the remembrance of the life which has ceased after the work of the day has been accomplished.

"The Board of Trustees, his Associates in the Faculty, and you my fellow-members, feel keenly the loss which we have sustained, yet with our sorrow should be mingled the remembrance that we have been partakers of the fruit of the labor of his life, benefits which will be a lasting memorial of his ability and devotion to the purposes and interests of this College.

"To few are given the various attainments possessed by Prof. Maisch. He was devoted to the department of Science which he had chosen for his special work; as a teacher he was laborious and untiring in his endeavor to bring before his classes all important features pertaining to *Materia Medica* and Botany, and while an instructor, he was himself a diligent student during his whole life. His retentive memory was an encyclopedia of information, and rarely was he found to be wanting or incorrect in his information.



"As Editor of the Journal of the College for 22 years, he discarded all matter not relevant to the true interests of Pharmaceutical Science; while his ready discrimination enabled him to sift rapidly the literature of his profession. When occasion required criticism, it was done in the kindly spirit characteristic of a mind in pursuit of facts, and not for antagonism.

"The amount of labor which he performed as Author, Editor, Permanent Secretary of the American Pharmaceutical Association for a long course of years, attest the activity and ability of his well-balanced mind.

"His character in private life is well known to all of us, and requires no eulogy from me.

"It is not the purpose of your Committee to sketch at this time a general outline of the life of our departed Associate; a suitable memoir will be prepared hereafter for publication in the Journal of the College. A strong man has been taken from us; let us endeavor to honor the memory of Prof. Maisch by a renewal of our interest in this Institution to which he was devotedly attached, and seek to maintain the high character of the chair left vacant by his decease."

The Secretary stated that the terms of Henry Trimble and of Jos. W. England as trustees expired with this date, and also that of Daniel S. Jones, deceased, and that an election would be necessary. Tellers being appointed, announced the election of the following gentlemen as Trustees for the ensuing three years: Henry Trimble, Jos. W. England and George M. Beringer.

Prof. Sadtler moved to proceed to an election, also to supply the place in the Board of Trustees made vacant by the death of Prof. John M. Maisch. Mr. Beringer offered a motion to postpone, and Mr. Ross a motion to lay on the table, alleging that undue haste might indicate a want of respect for the memory of Prof. Maisch, both these motions, being negatived, however, an election proceeded, the tellers finally announcing the selection of Jos. L. Lemberger, of Lebanon, Pa., for the position made vacant.

Upon a question arising whether in the event of a number of candidates being presented for choice, a plurality, or a majority of votes shall govern it was the expressed sense of the members that a majority of all votes cast should determine the result.

On motion, adjourned.

WILLIAM B. THOMPSON,  
*Secretary.*

## MINUTES OF THE PHARMACEUTICAL MEETING.

OCTOBER 17, 1893.

On motion, Dr. A. W. Miller was called to the chair.

The reading of the minutes was dispensed with, as they had been printed so long since that the members were doubtless familiar with them.

Professor Sadtler presented to the library a copy of the German edition of Wagner's hand-book of Chemical technology, two volumes of Geological Survey of Pennsylvania for 1891, and two for 1892; also a copy of Koenig's Nahrungsmittel and several Bulletins of U. S. Department of Agriculture.

Professor Trimble presented to the cabinet of the College a number of specimens of Oak Bark, eight or ten in number. Mr. Parker, of Connecticut, some specimens of the wood from which Connecticut nutmegs were made.

Mr. Hans M. Wilder presented, through Professor Trimble, a specimen of olive oil at least 1,800 years old; also a specimen of the white and yolk of an egg about the same age. They had been exhumed from the ruins of Pompeii, and there was every evidence that the "finds" were genuine. A vote of thanks was given to Professor Trimble and Mr. Wilder.

Professor Sadtler gave a very succinct and clear explanation of a new distillatory apparatus, patented by M. Barbet, in France. The apparatus exhibited was on a laboratory scale, large enough to demonstrate the successful working of the apparatus on a commercial scale. Its great advantage is that it can be used to rectify weak spirits from 50 percentage to 96 percentage at one operation, and that while doing this it is also possible to "pasteurize" the product so as to make it equal to liquors of several years of age.

Professor Trimble exhibited an improved method of securing the wooden handles to pestle heads; it consists of rings turned on the wooden handle, which pass certain projections in the opening in the head of the pestle and then by turning them they become locked. The invention is one of a recent graduate of the college, Mr. I. J. White.

Mr. Fox stated he had repaired broken pestle handles by having them turned of very dry wood and fitting quite closely. The moisture to which they are usually subjected swells them and thus secures them effectually in their place.

Professor Sadtler made a report on the Chemical Exhibit of the Columbian Exposition at Chicago. The first distinction to be noted was that between the raw or crude material and the manufactured articles. The most valuable and noteworthy in many respects of the exhibits of raw materials was in the Mines and Mining Building, and next that of the Agricultural Building. While the exhibit of mining industry in the aggregate was of surpassing interest and extent, there were some departments of it not nearly so well represented as they were at the Centennial Exhibition. This was notably so in the Lake Superior copper industry.

The Chilian nitrate industry, consisting of nitrate of soda or soda saltpetre as it is termed—also the iodide of copper, the form in which the iodine supply is shipped abroad, was finely illustrated.

The mineral wealth of the Western States formed a most striking feature of the exhibit. A statue of silver mounted on a golden pedestal was shown from Montana, the great silver producing State, while Colorado made the greatest display of gold. The deposits of malachite and azurite from Arizona, surpassed in beauty any that have been displayed. Zinc ores of very fine character were displayed, from Missouri, Wisconsin, and Wythe County, Virginia, being principally blende or sulphide, carbonate and silicate. The Salt Industry of New York State was well displayed, and Louisiana showed a statue of Rock Salt, which was quite noticeable.

The South African diamond fields, which are now known to supply by far the greatest quantity of diamonds of commerce, was shown both here and in connection with Tiffany & Co.'s display in the Liberal Arts Building; the blue clay deposits, washing and polishing, all formed a very instructive display. G. F. Kunz's (the mineralogical expert of Tiffany) display of precious stones of various kinds was a most remarkable showing of almost every kind of stone used for jewelers' use.

The Nickel Ores of Canada, now almost the entire source of commercial nickel in the country were shown very fully.

The Aluminum Industry—which has assumed such large proportions lately—was very well represented, the mineral usually worked being bauxite or oxide of aluminum—the metallic aluminum and its various alloys being exhibited.

A very interesting exhibit was that of the Frick coke works, being a complete model of the coke ovens at Connellsville, with the railways for distributing the coke and other products.

The Platinum industry, as exhibited by the work deposited by the factory of Heraeus & Co., at Hanau, Germany, and by Johnson & Matthey, of London, was very imposing. The large stills used in acid works, which are now lined with gold are not attacked by the acids while the concentration is being effected so that nearly absolutely pure acids may be obtained by the use of the lined stills.

A special chemical exhibit of the Roessler & Hasslacher Chemical Company showed especially cyanide of potassium as used in several processes in the metallurgical arts.

The products of the Stassfurt mines of Germany, which have entirely revolutionized the potash industry, included Carnallite, a chloride of potassium and magnesium—Kieserite and Kainite, these salts being now the sources of potash of commerce.

The output of the various factories depending on these minerals for their supply is enormous.

Linseed oil works were represented showing their various products of oil, meal and cake meal.

Louisiana Sugar Industry, showing the cane in its different states, also ramie fibre.

Chocolate Industry of Germany made a very fine display.

In the Agricultural Exhibit, among other things, Canada showed a mammoth cheese weighing 2,200 pounds.

The various Brewing Companies' exhibits were very extensive and noteworthy.

The display made by the State of Pennsylvania of mineral oils, crude and refined, while large, was completely eclipsed by that made by the Standard Oil Company. This exhibit showed the crude oil, the refined article, and the various products obtained in the processes of refining. The pipe line system was also illustrated with their pumping stations, so that a very clear idea of the whole business might be had from a careful study of the display.

Next to this the Russian oil display commanded great attention, as it was a very creditable display of their products.

The Russian Stearic Acid Works exhibited glycerin of great purity and pure white oleic acid.

The Florida Rock and River Phosphate Companies made extensive exhibits.

The Government Building contained an excellent display of minerals, and in the exhibit of the War Department, also various rifle and artillery powders, especially the smokeless powder.

In the Fisheries Building there was a great variety of products exhibited, cod liver oil being prominent among them.



The meat packing companies having their principal business centres here made a very extensive exhibit.

The Forestry Building was one of the most unique displays in the Exposition—woods of all kinds being there shown both in their rough state with the bark, and dressed smoothly and varnished, showing their structure beautifully.

The California exhibit was a very interesting one, the display of wines and fruit was varied—that of olive oil was particularly noteworthy.

The German Chemical manufacturers made most interesting exhibits, notably that of Ultramarine; a cave of Alum, coated with ultramarine, lighted in the interior made a beautiful display. Various manufacturers were represented in this collective exhibit. Schering, so largely engaged in chloral making, and Merck who also had a separate building in which his preparations were displayed very advantageously.

The German universities' exhibit included rare chemicals made by the professors of the different German schools.

The famous Berlin porcelain wares, so favorably known by chemists, made a good exhibit, while the other makers were also represented.

The exhibit of Norway was notable for its paper and wood pulp used in paper fabrication.

Essential oils of great variety were exhibited by Fritsche Bros., the agents of Schimmel & Co., of Germany.

Japan Camphor Company, a company which was conducted by Americans in Japan for the production of camphor upon American methods, was represented.

A large and interesting display of the various gums and resins used by varnish manufacturers, was also to be seen in the Manufactures Building.

A paper upon the revision of the Pharmacopœia, by Mr. Jos. W. England, was read, and led to considerable discussion, which was on motion deferred to next month's meeting.

On motion adjourned.

T. S. WIEGAND, *Secretary*.

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## OBITUARY.

*Daniel S. Fox*, Ph.G., Class '63, died at his residence in Reading, Pa., Tuesday, September 5, 1893, of progressive paralysis, aged 52 years. He graduated from the Philadelphia College of Pharmacy in 1863, and resided in Chicago for some years, where he met with an accident which resulted in the disease which caused his death. For 5 years previous to his death he had been blind and helpless. He was widely known as a pharmacist and was a member of the American Pharmaceutical Association and was also connected with the Pennsylvania State Pharmaceutical Association. He was unmarried and leaves two brothers, both residing in Reading, one of whom, Cyrus T. Fox, being a well-known journalist. He was a member of the Alumni Association, having joined in 1871.





# THE AMERICAN JOURNAL OF PHARMACY

DECEMBER, 1893.

## EFFECT OF CARBON DIOXIDE, CARBONIC OXIDE, SULPHURETED HYDROGEN AND WATER AND COAL GAS ON ANIMAL LIFE.<sup>1</sup>

BY JOSEPH R. WILSON,  
OF PHILADELPHIA,  
MEMBER OF THE FRANKLIN INSTITUTE.

Since the health of every individual is dependent upon the purity of the atmosphere, a knowledge of the effect of impurities in the air on animal life is of the highest importance to the community at large, but of special importance to those who work in coal, silver, lead, copper or gold mines, or at iron furnaces, coke ovens, etc., where impurities often exist, such as,

		<i>S. D.</i>
CO <sub>2</sub>	Choke damp or Carbon Dioxide, . . . . .	1529
CO	White damp or Carbonic Oxide, . . . . .	9678
H <sub>2</sub> S	Sulphureted Hydrogen or Hydrogen Sulphide, . . . .	1912

The statistics compiled by me from the Indices of the Library of the College of Physicians, Philadelphia, one of the most complete institutions in the world, show that 90 per cent. of the total scientific experiments on the effects of noxious gases on animal life have been made by the Germans and French, and for the last decade scarcely any experiments have been made in this direction by scientists of any nationality, the results obtained by our forefathers being accepted with a credulity seldom encountered in other branches of science. In addition to this, the poverty of information in the standard references on this subject is so great, that were any particular knowledge required, it would be necessary to make new experiments to determine the same. With these facts before

<sup>1</sup> Lecture delivered before the Philadelphia College of Pharmacy, November 21, 1893.

me, in grouping the results obtained in experiments with Carbon Dioxide, Carbonic Oxide and Sulphureted Hydrogen on animal life, the medical fraternity will at least have a condensation of experiments for reference, from many authorities combined with the results of my own experiments. I claim that my experiments are absolutely accurate, as the means employed for mixing the different atmospheres (the Shaw Gas Tester) is acknowledged to be as nearly perfect as human agency can make anything, and has been awarded the Elliott Cresson and Scott Legacy Medals for accuracy—the highest awards in the gift of the Franklin Institute, and is to gases what weights and scales are to solids.

It is not my intention to go into the constituents of the above gases, there being no necessity for my doing so in this paper. I have simply one object in view, to describe the effect produced by them on animal life, the result of recent experiments. The Shaw Gas Tester, which I used for mixing my gases in the centesimal proportions desired, is an apparatus simple, convenient and accurate, consisting of 2 pumps with pistons attached to a graduated arm, so that one cylinder can be set to pump 10 per cent. of gas and the other 90 per cent. of air—or vice versa; or any per cent. to the lowest fraction. It is the only instrument in the world capable of mixing gases accurately, rapidly, and continuously in any per cent. desired, the product of the two cylinders being forced through an ejector or mixer before delivery.

The animal under treatment is placed in a bell-shaped glass cylinder 16 inches high, 4 inches diameter at neck and 8 inches at base. The cylinder is placed horizontally on the table, with the neck towards the operator, and is connected with the instrument, at the neck, by means of a rubber tube. The animal rests on all fours facing the operator with its nose near the aperture through which the gases enter to the cylinder from the instrument or mixer.

The end of the bell-shaped glass cylinder is entirely open to the air so that the mixture of gas and air is discharged and replaced every 4 seconds by each stroke of the pump, always maintaining a constant mixture, preventing stratification, or contamination through the exhalations of the subject. The cylinder being of glass and perfectly transparent, enables the operator to observe every change in the condition of the animal.

The difference in results obtained by the various authorities has

caused me to make the following experiments to satisfy myself, an accurate knowledge on this subject being necessary to the pursuit of my profession, and I am well aware of the great difficulties experienced by my predecessors in making accurate mixtures of gases, owing to the crude appliances at their command for this purpose.

As a prelude to my experiments I will give the results obtained with carbon dioxide by scientists whom we are accustomed to quote :

CARBON DIOXIDE.

J. H. Merrivale says it extinguishes lights and is fatal to animal life.	
	Per Cent.
J. J. Atkinson says dangerous to life, . . . . .	8
lights extinguished, . . . . .	10
Fairley's Catechism—dangerous to life, . . . . .	3
will cause death quickly, . . . . .	10
lights will burn in, . . . . .	10 to 20
Sir H. Roscoes' Chemistry—will not support combustion of candle, . . . . .	3 to 6
Dr. A. Smith—lights extinguished, about . . . . .	2
would suffocate, . . . . .	4

Watts' Dictionary of Chemistry says: "Animals immersed in it soon die, not for want of oxygen, but in consequence of a direct poisonous action, violent spasms being sometimes produced; sometimes complete atony of the cerebral faculties."

Ency. Brit., Vol. 5, p. 87, says: "Will not burn; neither does it support combustion."

Dr. Karl Friedlander, of Berlin, in experiments on animal life, states that 62·8 per cent. killed a rabbit in 27 minutes; 65 per cent. killed a rabbit in 45 minutes, the higher per cent. in this instance taking longer to kill the rabbit than the lower per cent., showing a wide variation in his tests, which I can only account for in the imperfect appliances at his command for placing definite quantities of gas in the atmosphere and maintaining a constant mixture of definite proportions. Rabbits, like human beings, have their ailments, and I have found in the course of my experiments that disease in the shape of a fatty accumulation about the heart, disqualifies the animal entirely for tests of this nature, death resulting in one-tenth of the time necessary to produce the same result on a perfectly healthy animal, but in the above instance the difference in time of immersion in such a high per cent. is not great enough for me to

ascribe the difference in effect to any organic disease but rather to the imperfect mixing of the gases.

In all my experiments I have found that the smaller the animal the sooner it succumbed to poisonous gases. My first experiments were made with small birds, then I tried mice, after which I bestowed my attention on guinea pigs, finally selecting the rabbit as a base for the experiments which I now present.

#### EFFECTS OF CARBON DIOXIDE ON ANIMAL LIFE.

No. 1. I placed a rabbit in a glass cylinder and pumped in atmosphere of 10 per cent. of  $\text{CO}_2$  and 90 per cent. of air.

After one hour and seven minutes the rabbit gave no indication whatever of being affected, so I released it and allowed it to run with several other of its species, the effect of its treatment, contrary to expectation, was great exhilaration, instead of stupefaction.

RESULT.—10 per cent.  $\text{CO}_2$  and 90 per cent. air, 1 h. 7 m. inhalation; exhilaration.

No. 2. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 25 per cent. of  $\text{CO}_2$  and 75 per cent. of air for one hour, at the end of which time the animal showed no indication whatever of being affected and when released and placed with the others exhibited as much liveliness as any of them.

RESULT.—25 per cent.  $\text{CO}_2$  and 75 per cent. air, 1 h. inhalation; unaffected.

No. 3. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 50 per cent. of  $\text{CO}_2$  and 50 per cent. of air. At the end of two minutes the rabbit showed signs of being affected. At the end of three minutes the rabbit commenced to gasp regularly every two seconds.

At the end of 6 minutes gasps were 3 seconds apart.

"	10	"	"	4	"
"	12	"	"	6	"
"	14	"	"	8	"
"	15	"	"	9	"
"	16	"	"	10	"
"	17	"	death ensued.		

RESULT.—50 per cent.  $\text{CO}_2$  and 50 per cent. air, 17 minutes inhalation; death.

No. 4. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 75 per cent. of  $\text{CO}_2$  and 25 per cent. of air.



At the end of	2	minutes	rabbit	commenced	to	pant	rapidly.
"	3	"	"	it	became	stupefied	and gasped every 2 seconds.
"	5	"	"	gasps	were	every	3 seconds apart.
"	7	"	"	"	"	5	"
"	8	"	"	"	"	6	"
"	9	"	"	"	"	10	"
"	10	"	"	death	ensued.		

RESULT.—75 per cent.  $\text{CO}_2$  and 25 per cent. air, 10 minutes inhalation; death.

No. 5. I placed a mouse in a glass cylinder and pumped in an atmosphere of pure  $\text{CO}_2$ ; death was instantaneous.

RESULT.—Pure  $\text{CO}_2$ ; death instantaneous (mouse).

No. 6. I placed a mouse in a glass cylinder and pumped in an atmosphere of 25 per cent.  $\text{CO}_2$  and 75 per cent. air. At end of 3 minutes mouse seemed slightly affected but kept moving around the cylinder, in this test held vertically. At the end of ten minutes conditions were unchanged, so I displaced the atmosphere of 25 per cent.  $\text{CO}_2$  with pure air.

RESULT.—The mouse revived, instantaneously on first inhalation.

RESULT.—25 per cent.  $\text{CO}_2$  and 75 per cent. air, 10 minutes inhalation, slightly affected but recovered instantaneously in fresh air (mouse).

No. 7. I Placed a mouse in a glass cylinder and pumped in an atmosphere of 50 per cent. of  $\text{CO}_2$  and 50 per cent. air.

At the end of	10	seconds	mouse	showed	great	exhilaration.
"	20	"	"	its	activity	was greatly reduced.
"	30	"	"	it	became	stupefied.
"	35	"	"	gave	short	gasps.
"	45	"	"	gasps	were	long and apparently painful.
"	55	"	"	death	occurred.	

RESULT.—50 per cent.  $\text{CO}_2$  and 50 per cent. air, 55 seconds inhalation; death (mouse).

Experiments 5, 6 and 7 are only given here to illustrate the fact that the smaller the animal the less the power of resistance against  $\text{CO}_2$ .

#### CARBONIC OXIDE, $\text{CO}$ .

The results obtained by scientists whom we are accustomed to quote, on the effect of Carbonic Oxide on animal life, are first epitomized:

H. Letheby, M.B., M.A., Ph.D., etc., late Professor of Chemistry and Toxicology in the Medical College of the London Hospital, says

that 5 per cent. of CO killed small birds in 3 minutes; one per cent. in half that time; 2 per cent. will render guinea pigs insensible in 2 minutes. In all cases effects were the same. The animals show no signs of pain, they fall insensible, and either die at once with a slight flutter, hardly amounting to a convulsion, or gradually sleep away as if in profound slumber.

*Post-Mortem*—Blood a little redder than usual.

Prof. A. R. Leeds says: "The operation of pure CO is so immediate as to prevent the lungs throwing off a single charge received."

Watts Dictionary of Chemistry says: "It is a very poisonous gas, acting chiefly on the nervous system, causing giddiness when inhaled; sometimes acute pain in various parts of the body and after awhile complete asphyxia."

Buck, on Hygiene and Public Health says: "It is not so immediately fatal as Carbonic Acid Gas."

Ency. Brit., Vol. 5, p. 87, says: "It is an extremely poisonous gas, being capable of displacing the oxygen in the blood, owing to a compound with the hæmoglobin, with which the oxygen is ordinarily combined."

American Ency., vol. 3, p. 775, says: "It is more irrespirable and poisonous than Carbon Dioxide. Its inhalation from furnaces sometimes causes immediate asphyxia to the workmen."

I will now submit results of my own experiments on the effect of Carbonic Oxide on animal life, but have to omit several important tests, owing to the carelessness of a servant in destroying my notes.

No. 1. I Placed a rabbit in a glass cylinder and pumped in an atmosphere of 2 per cent. of CO and 98 per cent. of air. At the end of 10 minutes the posterior extremity of the rabbit became paralyzed; at the end of 18 minutes forelegs became paralyzed, and at the end of 20 minutes the rabbit became semi-comatose; at the end of 45 minutes condition had not altered; on being placed in the fresh air it revived sufficiently to maintain its equilibrium.

RESULT.—2 per cent. CO and 98 per cent. air, revived in fresh air after 45 minutes inhalation of the gas.

No. 2. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 2.5 per cent. of CO and 97.5 per cent. air. At the end of 5 minutes the rabbit became semi-comatose, but on being placed in pure air, recovered almost immediately.

RESULT.—2·5 per cent. CO and 97·5 per cent. air, revived in fresh air after 5 minutes inhalation of the gas.

No. 3. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 4 per cent. of CO and 96 per cent. of air. Death resulted in 4½ minutes.

RESULT.—4 per cent. CO and 96 per cent. air, 4½ minutes inhalation; death.

No. 4. I placed a mouse in a glass cylinder and pumped in an atmosphere of .2 of 1 per cent. of CO. At the end of 6 minutes the mouse showed no signs whatever of being affected.

No. 5. Increased the atmosphere to .5 of 1 per cent. of CO. At the end of 5 minutes, the mouse showed no signs whatever of being affected.

No. 6. Increased the atmosphere to 1·0 per cent. of CO. At the end of 30 minutes, the mouse showed no signs of being affected. Gave it then fresh air to revive it for 1 minute. Increased atmosphere to 2·0 per cent. CO. Mouse died in 10 minutes; death accompanied with a total relaxation of all the muscles.

RESULT.—2 per cent. CO and 98 per cent. air, 10 minutes inhalation; death (mouse).

No. 7. I placed a mouse in an atmosphere of 2·5 per cent. of CO and 97·5 per cent. air; mouse died in 5 minutes.

RESULT.—2·5 per cent. CO and 97·5 per cent. air, 5 minutes inhalation: death (mouse).

No. 8. I placed a mouse in an atmosphere of 10 per cent. of CO, 90 per cent. air; death resulted in 3 minutes.

RESULT.—10 per cent. CO and 90 per cent. air, 3 minutes inhalation; death (mouse).

In the absence of the missing tests, I have included experiments 4, 5, 6, 7 and 8, simply to illustrate the fact that the smaller the animal the less the power of resistance against CO.

#### SULPHURETED HYDROGEN.

I note again the results obtained by scientific authorities whom we are accustomed to quote, on the effect of *Sulphureted Hydrogen* on animal life:

Watts' Dictionary of Chemistry, p. 203, says: "An atmosphere of one-tenth of 1 per cent. of this gas, proves fatal to lower animals."

Extract from Public Health Reports and Papers, Vol. III, p. 75,

76, says: "It is poisonous and its action on arterial blood is a common lecture table experiment."

Ency. Brit., Chemistry, Vol V, p. 500, says: "It cannot be breathed with impunity, frequently giving rise to nausea and vertigo, even when much diluted."

American Ency., Vol. IX, p. 130, says: "Theuard found that a small bird would die in air containing fifteen one-hundredths of 1 per cent., and a horse in air that contained  $\frac{1}{4}$  of 1 per cent."

The results of my experiments on the effect of  $H_2S$  on animal life are as follows:

No. 1.

1. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 1 per cent. of  $H_2S$  and 99 per cent. of air.

2. I placed another rabbit, in another glass cylinder and pumped in an atmosphere of 1 per cent. of  $H_2S$ , and 99 per cent. of air simultaneously with the No. 1, using two Shaw Gas Testers as mixers for the operation, both connected with the same bag of  $H_2S$ .

Death occurred simultaneously in cylinders Nos. 1 and 2, at the end of one minute, preceded by violent convulsions which lasted about 10 seconds.

RESULT.—1 per cent.  $H_2S$  and 99 per cent. of air, 1 minute inhalation; death.

No. 2.

1. I placed a rabbit in glass cylinder No. 1, and pumped an atmosphere of  $\cdot 5$  of 1 per cent. of  $H_2S$  and 99 $\cdot 5$  per cent. of air.

2. I placed another rabbit in glass cylinder No. 2, and pumped in an atmosphere of  $\cdot 5$  of 1 per cent. of  $H_2S$  and 99 $\cdot 5$  per cent. of air, simultaneously with No. 1, using 2 Shaw Gas Testers as mixers for the operation, both connected with the same bag of  $H_2S$ . Death occurred simultaneously in cylinders 1 and 2, at the end of three minutes, preceded by violent convulsions which lasted about 15 seconds.

RESULT.— $\cdot 5$  of 1 per cent.  $H_2S$  and 99 $\cdot 5$  per cent. air, 3 minutes inhalation; death.

No. 3.

1. I placed a rabbit in glass cylinder No. 1, and pumped in an atmosphere of  $\cdot 2$  of 1 per cent. of  $H_2S$ , and 99 $\cdot 8$  per cent. of air.

2. I placed another rabbit in glass cylinder No. 2, and pumped in



an atmosphere of  $\cdot 2$  of 1 per cent. of  $\text{H}_2\text{S}$ , and 99.8 per cent. of air, simultaneously with No. 1, using two Shaw Gas Testers, as mixers for the operation, both connected with the same bag of  $\text{H}_2\text{S}$ . Death resulted simultaneously in cylinders Nos. 1 and 2 at the end of 10 minutes.

RESULT.— $\cdot 2$  of 1 per cent.  $\text{H}_2\text{S}$ , and 99.8 per cent. air, 10 minutes inhalation; death.

No. 4. I placed a rabbit in a glass cylinder and pumped in an atmosphere of one-tenth of 1 per cent. of  $\text{H}_2\text{S}$ , or the  $\frac{1}{1000}$  part and 99.9 per cent. of air. Death resulted in 37 minutes.

RESULT.— $\cdot 1$  of 1 per cent.  $\text{H}_2\text{S}$  or the  $\frac{1}{1000}$  part, and 99.9 per cent. of air, 37 minutes inhalation; death.

NOTE.—In all of the above tests rabbits were seized with convulsions 10 to 15 seconds after immersion in poisonous atmosphere, which lasted on an average about 12 seconds.

No. 5. I placed a rabbit in a glass cylinder and pumped in an atmosphere of  $\frac{2.5}{1000}$  of 1 per cent. of  $\text{H}_2\text{S}$ , and 99 and  $\frac{97.5}{1000}$  per cent. of air. At the end of 2 hours, rabbit showed no signs whatever of being affected, so I released it.

RESULT.— $\frac{2.5}{1000}$  of 1 per cent. of  $\text{H}_2\text{S}$ , and 99 and  $\frac{97.5}{1000}$  of air, after two hours inhalation; unaffected.

#### EFFECT OF ILLUMINATING OR COAL AND WATER GAS ON ANIMAL LIFE.

The frequent occurrence of accidental deaths from illuminating gas has caused me to make a series of experiments on this subject with a view to determining just how much risk we run in having a small escape of gas in our bed-rooms, for instance, and the results obtained ought to act as a warning to all who are anyway careless in turning off the stop-cocks before retiring, or who carelessly turn the gas low near a draft and find it blown out the next morning and the room filled with gas.

No. 1. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 75 per cent. of illuminating gas (water and coal gas) and 25 per cent. of air. Rabbit was immediately seized with violent convulsions and death ensued in 2 minutes.

RESULT.—75 per cent. illuminating (water and coal gas) and 25 per cent. air, 2 minutes inhalation; death.

No. 2. I placed a rabbit in a glass cylinder and pumped in 25 per cent. of illuminating gas (water and coal gas) and 75 per cent. air; on

the third inhalation the rabbit was seized with violent convulsions and urinated freely; at the end of one minute convulsions ceased, and at the end of 4 minutes death ensued.

RESULT.—25 per cent. illuminating gas (water and coal gas) and 75 per cent. air, 4 minutes inhalation; death.

No. 3. I placed a rabbit in a glass cylinder and pumped in 15 per cent. of illuminating gas (water and coal gas) and 85 per cent. of air; without any struggling it sank into a comatose state; at the end of 3 minutes it struggled feebly; at the end of 4 minutes urinated; and at the end of 6 minutes death ensued.

RESULT.—15 per cent. illuminating gas (water and coal gas) and 85 per cent. of air; 6 minutes inhalation; death.

No. 4. I placed a rabbit in a glass cylinder and pumped in 10 per cent. of illuminating (water and coal) gas and 90 per cent. of air; at the end of 13 minutes rabbit was seized with convulsions and died in 5 seconds.

RESULT.—10 per cent. illuminating (water and coal) gas and 90 per cent. air; 13 minutes inhalation; death.

No. 5. I placed a rabbit in a glass cylinder and pumped in an atmosphere of 5 per cent. of illuminating (water and coal) gas and 95 per cent. of air. At the end of 10 minutes rabbit was seized with strong convulsions which lasted 20 seconds, at the end of 20 minutes rabbit commenced to gasp; and at the end of 30 minutes death ensued.

RESULT.—5 per cent. illuminating (water and coal) gas and 95 per cent. of air; 30 minutes inhalation; death.

I did not analyze the illuminating gas for its constituents but the gas used was Philadelphia city gas, and I believe it contains about 30 per cent. CO.

I have other experiments on hand on  $\text{CH}_4$  carburetted hydrogen or fire damp, also the effect of carbon dioxide or choke damp on lights, the results of which it will afford me pleasure to make known in my next paper.

## A TALK ON VANILLAS.

BY CHARLES E. HIRES.

Read at a Pharmaceutical Meeting of the Philadelphia College of Pharmacy, Nov. 21.

The importance of Vanilla Bean and consequently the value of the subject of which I am about to speak cannot be more correctly estimated than by a brief glance at its importance and value as a factor in the commercial products of this country.

To the majority of men the use of Vanilla Bean is limited to a flavoring extract for ice cream, or to add a delicacy and piquancy to an after-dinner dessert; but to the specialist, familiar with its use, it assumes a magnitude that is really astonishing. In the year of 1892, in this country alone there was imported and consumed in the various industries and agencies requiring vanilla over one million dollars worth of this product, numbering over fifteen million beans, and employing in the operation of raising, picking, curing, packing and shipping over 35,000 people, constituting in value, in commercial importance, in capital involved, in its production and in the amount of labor required for its development, one of the most important products of this vast and rich country.

The vanilla bean is indigenous to the soil of Mexico. The chief centre of its cultivation is the state of Vera Cruz, and the metropolis of the Vanilla district is the city of Papantla. After twenty years of active experience in handling Vanilla, after a long and careful study of it as an article of commerce, and an intimate acquaintance of its various uses, and its growing value as an article of import, I became possessed with a desire to see it in its natural state, to ride beneath the forests where it grew, to pluck it by my own hands from its natural branch; to enjoy its sweet and delicious aroma in the land of its birth, and in general to familiarize myself with the growth and preparation of this wonderful product, which is so rapidly growing in favor as one of our 19th century luxuries.

Take down your map of Mexico and locate the city of Vera Cruz, in the state of Vera Cruz, situated on the western shore of the Bay of Campeche. Go north from Vera Cruz a distance of some three hundred miles to Tuxpan. Equip yourself there with a retinue of mustangs, servants, guide and interpreter, and start to the southwest on a three days' journey, over mountains, through impenetrable forests, over dangerous and treacherous morasses, and

through tropical jungles to the city of Papantla, situated about seventy-five miles from the coast, inaccessible by railroad or water, and in the heart of a wild and as lawless a country as you would care to visit, and you have reached the heart of the Vanilla growing district; only a few hundred miles by actual measurement, but requiring more time, toil, privation and danger than to make a trip to the Orient. The journey southward was one to me of absorbing interest and constant danger. Its strange inhabitants, its peculiar customs, its striking scenery, and its topographical and geographical features were so impressed upon me by my journey, that I know my audience will pardon a brief and hurried description of some of its most salient features as we pass on our southern march to the home of the Vanilla Bean.

Actuated by the desire before mentioned I left Philadelphia on the 31st of January of this year, on a bright, clear, cool, but pleasant Monday. Next day in the state of Indiana we struck a blizzard with the thermometer down to zero; reaching St. Louis we encountered the worst snow storm of the season with the thermometer below zero, and the cars impossible to keep warm. Leaving St. Louis at eight o'clock in the evening we journeyed southward, and the next morning found ourselves with the thermometer  $55^{\circ}$  above zero with a bright sun and no signs of the storm we had passed through but a few hours before. On, on we fly into Texas with the thermometer going higher the farther we proceed. At Austin it was  $70^{\circ}$ , and our heavy underclothing felt a little uncomfortable. At Laredo we came to the border of the United States and Mexico, with a feeling that at last we were in Mexico.

From Laredo on the Rio Grande to the city of Monterey it is a distance of 170 miles. After a run of a few hours we stopped in a little town—Salinas—we found ourselves here confronting a civilization entirely different from that which we have left; here were one story huts, thatched roof, a door, but no windows, women and children at the door, and the children half naked. No floor but that of hard dirt, no furniture but a chair and stand with a lamp; a bundle of clothes in one corner, probably used as a bed. Flowers were in bloom, a species of cactus six feet high was growing everywhere, and the Spanish bayonet, a queer shaped tree of the Yucca variety was the one prominent tree in the landscape. My Vanilla expedition has now carried me about 2,200 miles from Philadelphia



into new and strange surroundings. Let us stop for a moment in the investigation of a scene of interest.

We find here a singular and instructive commentary upon the silver question that is now agitating the country. I found that in spending money that this is one of the best countries in the world for this purpose—the more money I spent the more I had left, owing to the very low price of silver, and Mexican finances being based on silver values. The Mexican dollar (or peso) is worth 65 cents, and an American dollar is worth \$1.60. When I bought \$1.50 worth of goods, and gave a \$5 note I received \$6.25 in change, and it struck me as one of the most wonderful things in political economy that I had ever seen.

My next stop was in San Louis Potosi, 300 miles from Monterey. It has a population of 60,000. On the way you cross the Tropic of Cancer and pass from the temperate to the torrid zone. Here we come to fields and fields of the green Century plant.

I next visited Toluca, some 300 miles south of San Louis Potosi, and 45 miles north of the city of Mexico, the capital of the government, where I spent nine days.

Leaving the city of Mexico I proceeded to Pueblo, then to Jalapa, and on to Vera Cruz, taking the Ward's line of steamers up the coast to Tuxpan, where I arrived after a thirty hours' sail. Here a tug came to the mouth of the Tuxpan River and took me off, steaming up the river nine miles to the city of Tuxpan. The city has 10,000 inhabitants, and is composed principally of one story, limestone, thatched houses. After spending three or four days here getting my outfit together, consisting of four mustangs, servants, guide and interpreter, we started early on Monday morning for the Vanilla land.

Hastening on, we rode through a dense forest by a bridle path, where we had to go single file, which brought us to an Indian village on the Casonies River, after some thirty miles of hard riding besides having to ford several rivers. I would state here that the sun is intensely hot at midday, so that the most of the people retire from about 11 to 2 o'clock. We stopped about 11 o'clock, at a small village composed of bamboo and thatched houses, where we waited until four o'clock before proceeding on our journey, and arriving at Casonies in the evening at about twilight. On the Casonies River we saw hundreds of Indian canoes plying up and

down this stream with both men and women propelling them, which was a curious sight. We started early next morning for Papantla, where we arrived at about nine o'clock at night. This is some thirty-five miles further inland. It is a city of about 12,000 inhabitants, and is composed mostly of one story, limestone thatched houses. This is the metropolis of the Vanilla growing district, situated in the valley surrounded by high mountains on all sides. This is the county seat. Court was in session when we arrived there, and it was impossible to get accommodations at the one hotel or any of the boarding houses. The hotel is a one-story building, composed of three or four rooms; these were all turned into sleeping rooms at night, and everybody had to sleep together—men and women—cots were arranged side by side, until there was scarcely room to get around. As the climate here is always warm, eating is done mostly out of doors. By the courtesy extended to me through letters of introduction I had, I was taken and well cared for by Mr. Tremari, who is one of the first citizens and the largest curer and shipper of Vanillas in Papantla.

At last after countless difficulties and strange experiences I am at the goal of my journey. In the land of Vanillas, in the centre of a district from which a large portion of the world's supply of this luxury is derived, and in readiness to transform into a reality the dream of years, and from here I ask you to pause with me a moment to scan briefly the history of this strange and popular product of which little is known to the general student.

When the Spaniards discovered America the custom among the Aztecs of flavoring chocolate with Vanilla was already in vogue. The former borrowed the practice from the latter and transmitted it in turn to the other nations of Europe. A few years later this valuable product became an export article, and it is believed that the first Vanilla Bean introduced into Spain came from the state of Oaxaca. It is raised in divers parts of the continent, in the Island of Cuba and other Antilles, and in some portions of Africa and Asia as well, and as a rule wherever there is heat and moisture and shade, provided the lowest temperature in winter be not lower than 65° F.

At first that which grew wild in the woods was harvested, and the inference is clear that, in proportion to its gradual diminution and increasing consumption, it was found necessary to foster its growth and in this the state of Vera Cruz took the initiative, being

the first place known in which the plant is under cultivation in America. Notwithstanding numerous inquiries made by me, I have found it well-nigh impossible, even with the aid of tradition to ascertain the exact time in which the cultivation began; this alone being known, that the period is a remote one. From some of the old archives of Papantla we derive the information that in the year 1760 there were already in existence *Vanilla* forests under cultivation. The state of Vera Cruz has had and to-day possesses great natural advantages for the production of *Vanilla*. But it is cultivated only in the cantons of Misantla and Papantla. For a number of years Mexico supplied the markets of the world with this product, but of late years the island of Bourbon and Java have come in competition with European markets to a marked degree.

With this brief history of the origin and nature of *Vanilla* start out with me on a bright, clear morning in the month of February, with the thermometer ranging from 85° to 100°; dressed in thin linen, with a light Panama hat, and mounted upon a mustang for our first visit to the *Vanilla* fields, located about nine miles from Papantla. The first error that you need to correct is our northern conceptions of a field. It is not here the carefully tilled, snugly fenced, and finely cultivated tract of land that characterizes the marketable products of New Jersey or Pennsylvania, but a wild, boundless, dense and almost impenetrable forest, with undergrowth so dense and rank that our mustangs must be abandoned at a by-path, and we ourselves compelled to stoop almost to a creeping posture to penetrate it. Look at yonder tree—a Mexican cedar—20 feet in height, covered with dark green luxuriant verdure, with a small tapering trunk, a few feet in circumference, and clinging to and apparently growing out of its bark observe that strange looking, clinging vine, in circumference a little larger than an ordinary lead pencil, shooting up into the tree, covering its branches, and running from it into the adjoining trees, and often forming festoons and arbors so dense and thick as to exclude the rays of the sun at noon day. Covered with a dark green, and spear shaped leaf, and hanging pendant from its interlacing branches, green pods, from four to ten inches long, and you have a picture of a *Vanilla* vine as I first saw it in its native soil and in its highest state of cultivation. Tree after tree in this vast forest is covered with those luxuriant vines, peeping from which, in all the glory of tropical luxuriance, are countless

hundreds of the long, luscious, tapering Vanilla Bean; in circumference almost equal to a banana and from two to three inches longer. Some of a dark green and others of a bright yellow, and sometimes where they grow most luxuriantly resembling bunches of bananas, apparently growing upon the native trees of the forests. The remoteness from civilization, the total absence of everything indicating care or cultivation, and the strange juxtaposition of this wealth of ripened fruit to the wild and unbounded woods made the scene one of the most strange and marvellous upon which the eye ever rested. Vast areas containing hundreds of square miles of contiguous territory in this province are devoted to the growth of this plant: wherever you look and wherever you travel you are confronted with this overhanging vegetation. You behold the primeval forest utilized by the half-civilized natives as a natural garden for the growth of this delicious aromatic plant.

The cultivation of the plant consists of cutting away the forests to give it room to grow. The vines are naturally grown from cuttings, the same as grape vines, but they are also grown direct from the seeds, and in such cases the fruit is much later than when the vines are planted. The vine is very hardy in its native element, and sometimes takes root even if thrown carelessly on the ground, providing it has shade and moisture. Four or five years after the vine is planted and sometimes before that period, its base rots at some distance, and before this occurs rootlets form above that portion which is dying, have already grown and descended along the tree to get nourishment from the earth. This circumstance, added to the fact, that if a reed be severed some distance from the ground, it does not die, has given rise to two distinct theories respecting this plant, which I desire here to take the opportunity of correcting; the first theory which has the support of many reputable scientists is that the plant is Epiphyte, deriving its sustenance from the atmosphere, and being independent of the soil, and the second that it is a parasite, and derives its nourishment chiefly from the trees to which it clings. A careful examination of the plant in its natural forests and a patient study of its habits and characteristics have convinced me that both of these theories are founded in error, although, before my visit to Mexico, I confess I had been led to adopt the parasitic theory, upon information from many intelligent growers.



Mr. Fuenti told me he had made the experiment of severing the reed two or three feet from the ground, and in a few days later two or more tendrils had sprung from the lower end of the vine and gone directly to the earth, thus replacing the lost base. The reed is very juicy, and when deprived of its roots tries to replace them, complying with the laws of its own existence; but this is done at its own expense, taking nothing from the tree, which statement is proved by the fact that if it consumes too much time in its endeavor to reach the soil it withers. Should the tendrils reach the soil before the reed is entirely dried up, the latter recovers later; but, if on the contrary, its strength is not sufficient to accomplish the task of reaching the earth, it gradually withers until it dies. In spite of the facility with which the reed takes root and replaces its base, some die, either because the reed was not fresh and sound or because it was damaged, or by reason of its being in localities where it received too much sun or too much shade.

I found others familiar with the *Vanilla* growth contending that the plant depended for its nourishment and growth upon the sap of a particular tree—the Cojondigate, and in support of this theory I was taken to the forest and shown vines growing luxuriantly around the base of this tree, showing great fertility and productiveness, and a high state of health. But upon examination of the facts I found that this tree would grow only upon certain soil, and under certain conditions, where the soil was always moist, and the reason that the *Vanilla* grew so much better on this than on any other, was because the conditions that so well suited the tree were the very conditions that best suited the *Vanilla* Plant, and when speaking of my observations in this direction, they admitted that it might be possible, and when finding in one of the gardens of Papantla, a vine growing upon a dead tree, they could not but confess, that it was perhaps not a parasite. These good people had proven to me, or assured me, in their correspondence that the plant was a parasite, and it gives me pleasure to correct the error I was then laboring under. After making diligent inquiry about the plant I had the pleasure of meeting Agopito Fontecilla, who I soon learned was an intelligent man, and who had made a scientific study of the plant, and to whom I am indebted for the greater part of my knowledge of the plant.

Taking the average of the last ten years, the number of Beans

that has been gathered each crop has been above 15,000,000 with the exception of a small quantity gathered on the southern coast of Vera Cruz, some 100,000. The remainder comes from the cantons of Papantla and Misantla, mostly from Papantla. The prices which it has attained during that time have varied much, ranging from \$22 to \$125 a thousand. According to the data in my possession it averages \$60 to \$70, and produces over \$1,000,000. The smallest unripe Vanilla weighs 20 pounds to the thousand, and the largest 65 pounds to the thousand, and the average about 45 to 40 pounds. The average loss of weight in curing is about 9 pounds to the thousand. The length of the Bean varies as much as its weight, measuring from  $4\frac{1}{2}$  to 10 inches; the greater part ranging from 7 to  $8\frac{1}{2}$  inches. The plant (*Vanilla Planifolia*) grows a few yards in length each year, some portions of it clinging to the tree which supports it, and some remaining loose and hanging wave-like. Its thickness is about  $\frac{3}{8}$  to  $\frac{1}{2}$  inch. It is very juicy, round, and of a green color, knotty at intervals, leaves alternate shaped like spear and plump. The flower is yellow, and has a sweet, agreeable smell. The plant grows in length only. It does not grow anything like a grape vine, it only bears fruit upon the new portion that grows each year. The thickness of the Vanilla Bean decreases gradually from two-thirds of the lower portion to the tip. Its shape is almost round, somewhat flattened on one side, curving up to the neck which generally terminates in an arc. Its circumference varies, measuring when green from two to three inches, although the greater part measures three-fourths inches in diameter. It has a thin, smooth cuticle, with two superficial lines on either side. When thoroughly ripe its color varies from dark green to light yellow. Its lower portion is filled with small seeds, and after being treated its thickness is reduced to one-fourth of its original size. It remains black, oily, and has an agreeable perfume.

Around Misantla there are often several varieties, these are known as Misantla Bean, having thick skins. They are not packed as well, and are not considered as valuable as the Papantla curing. These varieties are designated by the natives as Cimarrona, Mestiza, Manza. When cured only an expert can tell the different goods. The wild or Pompoma Bean, Segne Xante, or sometimes called banana vanilla by the Totonaca Indians who eat them, is to be found here. This plant differs from that of the *Vanilla Planifolia*, in that it is much

smaller with larger leaves and less pointed. The Bean is about twice as thick and of a triangular shape somewhat resembling the ordinary banana when insufficiently nourished. It has an agreeable fragrance, resembling that of the Anise plant. It is commonly and naturally supposed that the Beans grow and thicken until approaching ripeness. It is not so, for after it is two months and a half old it ceases to increase in size. Mr. Tremari said he had made several observations during the past two years, measuring *Vanilla* from different vines, and has found that some after the middle and some after the last half of June have neither grown nor thickened in the least.

The vine puts forth many blossoms, but the greater part do not bear, and those attaining full growth fall, or turn yellow and crack prematurely, owing to some disease in the reed, the bean, however, clings to it. This serves as a pretext for some persons to say that in October and November the *Vanilla* Bean is ripe and should be cut, not bearing in mind that its apparent ripeness arrives from sickness in the plant, as shown by its defective nutrition, being soft to the touch and lacking the solidity of the ripe bean.

I found that the plants grew best in virgin soil where streams and brooks abound, and where the earth is a little sandy, and the dampness is retained longer than in any other soil; in these places the vines grow luxuriantly and vigorously, and yield large fruit, a most important factor, when one considers how scarce rain is in this section between February and July. Marshy ground is likewise undesirable, as an excess of moisture rots the vine. It is found that plants do best where a little sunlight can reach them, and the largest growers have trimmed out the heavy foliage that covers many plants. Yet vines exposed too much to the sun yield little vanilla, and what they do yield is small; the plants soon get yellow and die in a few years. On the other hand, those with heavy foliage never thicken. Their color remains a rich green, and finally sickens. The bean they yield is likewise small, badly nourished, and ripeness is retarded. After setting out the vines, if they do well, they will commence to bear fruit in about three or four years; its yield increases for four or five years, when it begins to decrease. It bears little vanilla after the tenth year. These vines yield when fully developed 85 and some as high as 200, although these are very rare. Some vines have branches that bear as much as 12 to 15 bean.

The proper time for the Mexican Vanilla Bean to ripen is in January or February, but such a demand is made for the Bean that for several years the growers begin to gather the crop in October and November, so that the harvest is over before the time it should have commenced, and this Vanilla weighs one pound less to the thousand, and remains red and subject to changes. Vanilla, if allowed to ripen naturally, remains black, juicy, and of a silvery hue shortly after its curing, and for many years it can be preserved unchanged, but if cut prematurely it is affected much, as any other fruit naturally is when picked two or three months before the time, and it never looks as it should when this is done. In order to impart to the bean all the good properties of which it is susceptible it should be cut as it becomes yellow, for, if it be cut all at once, even though it be in the month of January (as was the practice some years ago) the result will be that a great portion of it will remain unripe, because as it blooms in March, April or May, this same gradual change continues, everything being equal, until it ripens. There is, besides, another cause which brings about the same difference even in the case where they blossom together, and that is the greater or less shade afforded by the trees on which the vines grow. In former times, in compliance with an order from the government, the sub-delegates, and after them the civil authorities were instructed to see that the unripe fruit should not be cut. When this duty fell to the lot of conscientious and active persons abuses were in a great measure avoided, but complete satisfactory results were far from being attained on account of the scarcity of the necessary means to watch and pursue smugglers. At other times the office was applied for by indolent persons, who regarded the orders of the government with indifference, and thus the law soon fell into disrepute, and was finally abolished by the government. The difference between the price of the Vanilla picked during October and November, and that picked after January is in the proportion of three to nine. Those acquainted with this fact seeing those Beans sell for the third what they know by their yearly experience could be sold for nine because they do not want to wait two or three additional months might think them foolish, or would imagine that poverty compelled them to suffer this loss; but it is neither the one thing nor the other, because these people are clear headed and their prosperity so general that it may be said there are no people in the world who



live in greater ease than do these people of Papantla, and this is not alone due to the fertility of the soil and the good quality of the products which are obtained by cultivation, but also because in their forests important products grow wild which are the property of any one willing to gather them. The motives actuating these people in selling the Vanilla before it is ripe, are caused by avarice on the one hand and rascality on the other. The first Vanilla sold has, as a rule, been stolen, and as it is cheap, though of poor quality, it is always a bargain for the buyer. The planters who have Vanilla Beans somewhat distant from their homes as soon as they know of any purchase or sale, cut their own Beans, fearful lest the same be stolen, as they know by experience that, immediately upon the start of such traffic, complaints are heard from the unfortunates, who in a short time are deprived of the results of hard labor and care. This abnormal condition of affairs goes on, and thefts repeatedly occur even in the best guarded Vanilla forests, whose owners cannot constantly oversee by day and by night, as other duties require their attention. For this reason they decide to cut and sell the Vanilla Bean at very low figures, rather than to suffer total loss. For no other reason is the fruit gathered and sold before it is thoroughly ripe. This unseasonable traffic, both immoral and highly prejudicial to the property interests of these cantons, should be checked by proper legislation; in this way the crop and the quality of the goods would be much greater, and its superior and delicate flavor that justly belongs to the best Mexican Vanilla Bean would make it esteemed above any other aroma in the world.

In curing Vanilla it is an easy matter to impair it either by an excess or lack of dryness, perfect curing is only attained when the Bean is left in such a condition that it remains juicy and retains its greatest possible weight, a consummation which the expert should constantly aim at. If the Vanilla is cut when ripe success will be easy, but when cut prematurely as has been the case during many years, art has to replace nature as far as possible, which can be done only through labor and substantial knowledge of the subject, so that some idea may be formed of the delicate care needed for this operation. Suffice it to say that even the best known experts sometimes permit the Vanilla to dry too much, or else, the greater part of it, not to say all, becomes filled with insects, either before or after the process of curing. It

is only necessary to allow it to remain in the sun three or four minutes more or less than is required to bring about one or the other of these results. Great care and fine eyesight are required in the separation of the diseased from the sound, because, if only one remains undetected it will mould and endanger other bundles in a short time. The curers in Papantla excel in curing and bunching the bundles, and in the regularity and evenness with which they classify the size and quality. As a rule planters do not know how to prepare the Bean, so they sell them in an unripe state to curers who yearly employ experts for that purpose. The Beans are brought in by the natives in large and small lots very similar to the way in which our country people bring in rags, butter and eggs to the town storekeeper. The Bean are first put in a sweat box, where they are sweated about 36 hours. They are then placed on mats in the sun if the day is bright and clear, if not they are placed in a large oven to dry. This requires the utmost care and attention, else the Beans are easily spoiled. After the excess of moisture is dried out, they are again sweated. This operation is repeated until they are black. They are then placed in the sun in the middle of the day only from eleven to one; they are then put in racks in Vanilla rooms, one above the other. While the curing is going on it is necessary to separate them with the utmost care; the discolored from the black bundles, the very small, the impoverished, those with skin woody at intervals, the ones with a tough, thick and smooth skin, and also the spotted, cracked or split Bean, assorting them in their respective classes. The great care to be exercised in curing Vanilla can be appreciated by what I have said before; but it is not amiss to observe that however little it is over dried it is sufficient to reduce the weight almost one pound to the thousand, which would be a great loss, besides the Bean that is over dried loses some of its color, and depreciates its value one or two dollars a pound, which amounts to as much as the loss in weight. When the Vanilla is thoroughly ripe it is easier to ascertain the required point of curing, and besides gives less trouble and is not so exposed to changes. It gets silvery white being cured, and in a few months it is crystallized, and will be preserved in this way for a number of years. If cut when unripe just the opposite happens, for not only are few crystallized but their keeping quality is poor. After the Beans are thoroughly cured, which takes from three to four months, they are assorted in different sizes

and bundled in bundles containing from 50 to 75 Beans each. The different curers having different amounts for their packing. Some 50, some 60, others 70 and some 75 to their bundles. These bundles are all uniform in size according to length, and are placed in cans of 40 bundles each; then four or five of these cans of different sizes are packed in a case made of Mexican red cedar, which is the most plentiful wood grown here. A curer stated to me that the making of these cases was the most expensive part in putting the Bean up, as they have no machinery such as saw mills and planing mills, everything must be done by hand, which necessarily takes some time to make one of these cases, as the corners of each are grooved and dovetailed together, making the case cost, when completed, from \$2 to \$3.

After the Beans are cased the cases are then covered with a fibre matting made here by the Mexicans and the Beans are ready for shipment. Mules or burros, in some cases mustangs, are drawn up in line and two cases are strapped on the back of each animal, and, started for the sea-coast in caravans of perhaps eight or ten animals with two or three attendants; then shipped on steamers for Europe and the United States.

In going from the interior of Mexico you will meet caravans of these beasts of burden laden with all kinds of merchandise, this being the only way of transportation. The authorities for some time have been endeavoring to get a railroad to Papantla, but as yet have been unsuccessful. The Aztecs or native Indians do not want to have any improvements. Several attempts have been made to survey a road, and just before reaching there I was advised of a civil engineer who had been sent to survey a route and who was next day, after his arrival, found hanging to one of the trees outside of the town. The natives do not want anything different from what they have been used too, and will sacrifice their lives in defence of what they consider their rights.

I returned to America with a conviction that notwithstanding our national character of penetrating to the utmost corners of the earth, that as a people we know little or nothing of Mexico, a great, broad, rich, fertile tract of land, magnificently endowed by nature and so favorably located, as respects soil, climate and physical conditions, that in my judgment it is ere long to become the most prolific source of supplies for many of the essential and valuable products

needed by the world, and of her varied and valuable industries, none are more promising and give indications of more important growth than does the Vanilla Bean. The infusion of greater intelligence in the minds of the natives engaged in its development, the employment of better means for its preservation and cultivation, the opening of newer and larger districts for its supply and a more intimate and scientific knowledge of its natural requisites, would in a few years multiply manifold the volume of this commerce, and would permit it to be placed upon our markets and markets of the world in a far better condition, as respects quality, and at a price that would largely stimulate its use.

I returned to Philadelphia satisfied that my expedition had been of great practical value to me, and that if more merchants and business men, deeply interested in handling and marketing Vanillas could be induced to turn their interest and attention to the conditions and restrictions that surround the production, many of the difficulties and hazards that retard its cultivation, that make its production so precarious, and mar its perfections, and so materially increase the cost of transportation, would in a few years be materially overcome.

I look at the Vanilla Bean with a new interest. I see in it something of the history of a peculiar people. Its delicate aroma is to me suggestive of the bright blue sky, the blazing sun, the tropical luxury, and the rich atmosphere of the country where it grows, almost the spontaneous child of nature, yet so potential and useful in the varied needs of our complicated life of to-day.

I trust that the brief and hurried view of its habits and peculiarities that I have been able to give you in this brief talk have been of some interest and value from a scientific standpoint and may have tended to render more accurate and definite your botanic knowledge of the Vanilla Plant, and may have cleared away some of the superstitions and uncertainties that have in the past clouded its history. If so, the object of my talk will have been fully accomplished, and I will have been fully repaid for the little time I have spent in throwing together the somewhat desultory remarks.



## NOTES ON THE EXAMINATION OF BEESWAX.

BY LYMAN F. KEBLER, PH.C., B.S.

Read before the Philadelphia College of Pharmacy, November 21, 1893.

When the contribution<sup>1</sup> on "An Examination of Beeswax," by E. G. Parry and P. A. Estcourt appeared as representing the sophistication of this article in the English market, the writer had nearly completed a communication on the same subject in the United States.

The waxes examined, and the results submitted below, were samples sent to this laboratory during the past year and fairly represented the commercial article.

Beeswax is a mixture of *myricin*, *cerin* and *cerolein*. Myricin ( $C_{46}H_{92}O_2$ ) forms the chief constituent of wax, is insoluble in alcohol and fuses at  $64^\circ C$ .

Cerolein constitutes only from 4–5 per cent. of the wax, has an acid reaction and is the constituent to which wax owes its tenacity, odor and color.

Cerotic acid or cerin ( $C_{27}H_{54}O_2$ ) is not a constant in beeswax.

B. C. Brodie,<sup>2</sup> in his classic work, "Untersuchung über die chemische Natur des Wachses," has shown that cerin consists essentially of a high fatty acid, *i. e.*, cerotic acid while myricin is the palmitic ether of melissic alcohol. F. Schwalb<sup>3</sup> and F. Nafzger<sup>4</sup> have proven wax to contain small quantities of acids related to cerotic acid as melissic acid, also some non-saturated acids of the oleic acid series and some alcohols related to cerylic alcohol as melissic alcohol. They have also proven it to contain saturated hydrocarbons, such as hentriacontane ( $C_{31}H_{64}$ ) and heptacosane ( $C_{27}H_{50}$ ).

It was thirty-four years after the composition of beeswax was made known or the way paved for the introduction of a method before a method was proposed for the examination of this article based on the determination of the free and combined acids, respectively.

*The Acid and the Ether Numbers* — These were determined by the

<sup>1</sup> 1893, read before the Brit. Pharm. Conference; Nottingham, through the Am. Drug. and Pharm. Record, **23**, 158.

<sup>2</sup> 1848, Ann. Chem. (Liebig), **67**, 180; Phil. Trans., London, **136**, 147. 1849, Ann. Chem. (Liebig), **71**, 144.

<sup>3</sup> 1884, Ann. Chem. (Liebig), **224**, 225.

<sup>4</sup> 1886, Ibid., **235**, 106.

well-known method of Hübl<sup>1</sup> (not the iodine number) who was the first to apply the method in a practical way. The method is sometimes awarded to Hehner, who translated his results into cerotic acid and palmate of myricle. Hehner<sup>2</sup> applied the method about half a year before Hübl, but Becker<sup>3</sup> was the first to apply the principle of Köttstorfer<sup>4</sup> to the analysis of beeswax. Hübl's method is now recognized as the most elegant, most convenient as well as the best method for establishing the purity of this article. The method<sup>5</sup> in detail is: heat 3 or 4 gms. of the wax with 20 cc. of neutral, 95 per cent. alcohol, titrate while hot with a seminormal alcoholic solution of potassium hydroxid and phenolphthalein, to estimate the acid number, now add 20 cc. more of the alkaline solution and saponify by boiling the solution briskly with a reflux condenser for one hour to insure complete saponification. The excess of alkali, is then titrated back with seminormal hydrochloric acid. The number of mgs. of potassium hydroxid required to saturate the free acids of *one gram* of wax is called the "acid number," that required to decompose the wax ethers the "Ether Number."

The acid number varies from 19–21 mgs., the ether number from 73–76 while their ratio is from 1:3.5 to 1:3.8. For complete saponification from 92–97 mgs. of potassium hydroxid are required. After having secured the acid and the ether numbers the quantity of cerotic acid or its equivalent and myricin are easily calculated. Extreme care must be taken in the titrations on account of the extraordinarily high molecular weights of both cerotic acid (410) and myricin (676). 1 cc. of normal alkali represents 410 mgs. of cerotic acid and 676 mgs. of myricin, respectively.

*Determination of the Alcohols.*—Unquestionably the alcohols of beeswax belong to the same series, consequently they possess the same chemical properties. Dumas and Stas described an important reaction of the fatty alcohols, viz: the reaction which they give when heated to a moderate temperature with potassium hydroxid. These alcohols when so treated are converted into the correspond-

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<sup>1</sup> 1883, Dingl. poly. J., **249**, 338.

<sup>2</sup> 1883, Analyst, **8**, 16.

<sup>3</sup> 1880, Corr. Bl. Ver. anal. Chem., **2**, 57; Abst. Zeit. anal. Chem., **19**, 241.

<sup>4</sup> 1879, Zeit. anal. Chem., **18**, 199 and 431; Analyst, **4**, 106.

<sup>5</sup> 1892, H. Röttger, Chem. Ztg., **16**, 1837; J. Chem. Soc., **64**, 351.  
G. Buchner, Ibid., **16**, 1922; Ibid., **64**, 351.

ing acid or alkaline salt and hydrogen is simultaneously disengaged. For example, when melissylic alcohol is distilled with potassium hydroxid the alcohol is decomposed, hydrogen being evolved on the one hand and potassium melissate formed on the other, or recalling a more familiar example where potassium acetate is formed by treating ordinary alcohol in a similar manner. The constituents of wax, not alcohols, are not affected by this treatment, consequently by measuring the volume of hydrogen evolved, from a given weight, the proportion of alcohols can be approximately estimated. C. Hell,<sup>1</sup> H. Strürcke<sup>2</sup> and F. Schwalb<sup>3</sup> applied the above reaction to beeswax long before MM. A. and P. Busine<sup>4</sup> did, but it was these last two investigators who simplified the apparatus and studied the conditions of success. They proceed as follows: melt 2–10 gms. of the wax in a porcelain dish, mix with an equal weight of pulverized caustic potash, mix the mass again with three or four times its weight of pulverized caustic potash, then introduce the mixture into a flask and heat on a mercury bath to 250° C. for two hours. The reaction begins at 180° C. The volume of hydrogen evolved by one gram of the wax varies from 53.5–57.5 cc., at 0° C. and 760 mm. pressure, corresponding to a percentage of melissic alcohol varying from 52.5–56.5.

*Determination of Hydrocarbons.*—The hydrocarbons are determined very readily by treating the residuum of the preceding determination with an appropriate solvent, such as ether. In the above residue all the acids of the wax and the alcohols have been transformed into a state of alkaline salts, while the hydrocarbons alone remain intact. Hydrocarbons are found in wax in almost constant quantity, varying from 12.72–13.78 per cent.

The writer did not execute the last two operations because the apparatus of M. Dupre was not available.

*The Iodine Number.*—By treating wax with iodine a new number is obtained which is of considerable value for analytical purposes. This number was determined by the conventional method, Hübl.<sup>5</sup> The

<sup>1</sup> 1884, Ann. Chem. (Liebig), **223**, 269; Chem. Ztg., **8**, 859.

<sup>2</sup> 1884, Ibid, **223**, 295; Chem. Ztg., **8**, 860.

<sup>3</sup> 1886, Ibid, **235**, 106.

<sup>4</sup> 1890, Bull. Soc. Chim. (3), **3**, 567; Chem. Ztg. Reper., **14**, 225.

<sup>5</sup> 1884, Dingl. poly. J., **253**, 281; J. Chem. Soc., **46**, 1435; Am. Chem. J., **6**, 285; J. Soc. Chem. Ind., **3**, 641.

amount of iodine absorbed by the wax being small it was necessary to use a larger quantity of the substance than ordinarily, consequently more chloroform was needed. The method<sup>1</sup> in detail is: dissolve two grams of the wax in 40 cc. of chloroform in a glass stoppered flask. Add 25 cc. of an iodine solution, containing 25 gms. of iodine and 30 gms. of mercuric chloride dissolved in 95 per cent. alcohol and made up to one liter, and shake. Place the flask into a dark closet for three hours, then add 15 cc. of a 10 per cent. solution of potassium iodide and 100 cc. of water, finally titrate the free iodine with a standardized solution of sodium thiosulphate. The "Iodine Number" expresses the per cent. of iodine absorbed by the wax. It is quite essential to carry blank experiments in order to secure reliable results.

*The Melting Point.*—This is determined as follows: dip the bulb of the thermometer into the sample of melted wax, for an instant, on cooling, the bulb is covered with a film of the wax, introduce the thermometer into a wide-mouthed bottle through its perforated cork. The bottle is now hung into a beaker containing water at about 65° C.; carefully noting the temperature at the instant a hanging drop is formed, this is taken as the melting point. Other<sup>2</sup> methods were used but the above method gave concordant results without consuming too much time.

*Specific Gravity.*<sup>3</sup>—This was obtained by diluting alcohol so that the wax, previously melted and cooled normally would float indifferently in it. The specific gravity of the alcohol being identical with that of the floating wax it is necessary only to secure the specific gravity of the liquid with a picnometer or a specific gravity spindle and we have the specific gravity of the wax. The most trustworthy methods employed for securing the specific gravity of fats, waxes, etc., are given in the *U. S. Bull.*, No. 13, 40–43.

*Stearin, Stearic Acid, etc.*—Any foreign acid can easily be detected

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<sup>1</sup> U. S. Bull., No. 13, 818.

<sup>2</sup> 1883, Guichard, Proc. Royal Soc. Ed., 106, 432, 532; Zeit. anal. Chem., 22, 70.

1884, H. Krüss, Zeit. f. Instrumentenkunde, 4, 32.

1886, C. Reinhardt, Zeit. anal. Chem., 25, 11.

1887, H. W. Wiley, J. Anal. Chem., 1, 39.

<sup>3</sup> 1879, Hager, Analyst, 4, 206.



by Hübl's method. Fehling's method<sup>1</sup> gives an unmistakable turbidity with *one per cent.* of stearic acid and is executed thus: boil one gram of the wax in a test tube with 10 cc. of 80 per cent. alcohol for a few minutes, allow to cool to 18° or 20° C., filter, to the filtrate add water and shake. If stearic acid is present it separates in flocks on the surface, leaving the underlying fluid nearly clear.

A. H Allen<sup>2</sup> gives a method depending on the insolubility of lead stearate in alcohol. Proceed thus: boil the wax for 40 minutes with 20 parts of alcohol, cool, the cerolein and some of the stearic acid remain in solution. Filter and treat the filtrate with an alcoholic solution of lead acetate, if a flocculent precipitate of lead stearate is formed, stearic acid is contained in the wax.

F. Jean's method<sup>3</sup> was also tried but proved unreliable, at all events waxes proven to be free from stearic acid by Hübl's and Fehling's methods gave unmistakable evidence of stearic acid.

7.8 cc. of seminormal alkali equals one gram of commercial stearic acid.

Stearin may be detected by the methods employed for stearic acid.

*Rosin.*—E. Donath's method<sup>4</sup> modified by E. Schmidt<sup>5</sup> was applied in each case and is executed thus: place 5 grams of the wax into a flask, add 20 cc. of crude nitric acid (sp. gr. 1.32) heat the mixture to boiling and keep at this temperature for one minute. Add an equal bulk of cold water, then an excess of ammonia water. With pure wax the alkaline fluid is colored yellow only, but in presence of rosin a deep brown.

*Paraffin.*—Paraffin is a common adulterant of beeswax, in fact, some samples of wax might more appropriately be reported adulterated paraffin for as high as 80 per cent. of this substance has been found mixed with wax in our markets.

There are many methods<sup>6</sup> for detecting paraffin and its allies but the process of the U. S. Pharmacopœia has given the writer results as reliable as any and is outlined thus: "If 5 Gm. of Yellow Wax be

<sup>1</sup> 1858, Dingl. poly. J., **147**, 222; see also Chem. Ztg., 1890, **14**, 606.

<sup>2</sup> Commercial Organic Analysis, **2**, 213.

<sup>3</sup> 1891, Bull. Soc. Chim. (3), **5**, 3.

<sup>4</sup> 1873, Ding. poly. J., **205**, 131; Abst. Zeit. anal. Chem., **12**, 325.

<sup>5</sup> 1877, Ber., **10**, 837; Zeit. anal. Chem., **17**, 509.

<sup>6</sup> See References, U. S. Bull., No. **13**, 828, and Chem. Ztg., 1890, **14**, 607.

heated in a flask, for fifteen minutes with 25 cc. of sulphuric acid, to 160° C., and the mixture diluted with water, no wax-like body should separate." Care, however, must be exercised in applying the test as has been shown by C. C. Sherrard<sup>1</sup> and C. M. Morse.<sup>2</sup>

The paraffin is estimated by decomposing a weighed portion of the wax with concentrated boiling sulphuric acid, the charred mass cooled, washed with water, dried and extracted with a Soxhlet's apparatus by means of ether. The paraffin hydrocarbons are thus obtained in a fairly pure state.

*Japan Wax.*—E. Buri<sup>3</sup> regards this wax as a mixture of glycerides and not as a dipalmitin. There are a number of methods claimed by their various authors to be efficient in detecting this adulterant in beeswax, but none has proven itself very effective in the writer's hands. The borax<sup>4</sup> and sodium carbonate<sup>5</sup> methods only deserve mention. Experience has shown that it would be better to abandon the borax method also or at least be *extremely cautious* in judging from its results, for the separation into layers takes place easier on paper than in the test tube.

Donath's<sup>5</sup> general reaction for rosin, tallow, stearic acid and vegetable wax gives a valuable indication but is not specific enough. He directs to boil 1 or 2 grams of the wax with 6 or 8 cc. of a concentrated solution (1-6) of sodium carbonate for one minute; if an emulsion ensues which is persistent after the liquid has cooled, the wax contains one of the above adulterants.

*Soap.*—This adulterant can easily be detected by boiling a small piece of the wax a few minutes with water, cooling, filtering and treating the filtrate with hydrochloric acid. A precipitate indicates the presence of a soap.

*Mineral matters.*—Such substances as *kaolin*, *gypsum*, *heavy spar*, *yellow ochre*, etc., are said to be frequently used as adulterants for beeswax, but examinations of late show that the days of such gross sophistication is nearly past. Adulteration of recent days has in many cases assumed the position of a science.

*Starches.*—The various starches can easily be detected with the

<sup>1</sup> 1892, Proc. Am. Pharm Assoc., **40**, 252.

<sup>2</sup> 1888, Thesis, College of Pharm., Mass.

<sup>3</sup> 1879, Arch. d. Pharm. (3), **14**, 403.

<sup>4</sup> Hager, 1862, Pharm. Centrhalte, **3**, 207; 1880, Dingl. poly. J., **238**, 356.

<sup>5</sup> Donath, 1872, Dingl. poly. J., **205**, 131; Allen's Com. Org. Anal., **2**, 212.

aid of a microscope or by boiling a small piece of the beeswax with a little water, cooling, filtering and to the filtrate adding a few drops of a test solution of iodine. A blue coloration indicates a starch.

Serial Number.	Melting Point.	Specific Gravity at 15° C.	Acid Number.	Ether Number.	Total.	Ratio.	Cerotic Acid.	Myricin.	Total.	Ratio.	Iodine Number.	Adulterants.	Description.
1	64.41	9600	20.30	74.20	94.50	3.650	14.86	89.57	104.43	6.028	8.35	—	Pure Yellow Wax.
2	62.81	9608	20.40	70.00	89.40	2.418	21.52	84.50	106.02	3.92	9.31	Stearic Acid.	"
3	63.20	9602	18.20	65.80	84.00	3.614	13.32	89.57	102.89	6.731	8.50	—	"
4	63.86	9624	20.30	77.00	97.30	3.788	14.86	92.95	107.81	6.547	8.71	—	"
5	54.42	9120	14.70	45.59	60.29	3.101	10.76	45.63	56.39	4.240	5.63	Paraffin.	"
6	63.81	9641	19.66	75.60	95.20	3.857	14.35	91.26	105.61	6.352	7.26	—	"
7	63.43	9630	20.10	74.20	94.30	3.681	14.85	89.57	104.42	6.028	6.80	—	Pure Bleached Wax.
8	64.44	9710	20.30	77.00	97.30	3.788	14.86	92.95	107.81	6.193	6.30	—	"
9	62.22	9600	19.66	65.80	85.40	3.357	13.35	76.93	90.28	5.755	9.80	—	"
10	60.00	9420	26.20	59.50	85.70	2.260	18.45	71.82	90.27	3.802	11.10	Paraffin, Stearic Acid.	Pure Unbleached Wax.
11	63.00	9620	18.64	74.49	92.53	4.132	13.16	89.95	103.11	6.821	8.70	—	"
12	63.10	9681	29.40	71.40	100.80	2.430	21.52	86.19	108.71	4.00	9.66	Stearic Acid.	"
13	59.00	9431	17.50	71.35	88.85	4.010	12.81	87.03	99.84	6.89	7.00	Paraffin.	"
14	64.41	9681	17.50	67.20	84.70	3.942	12.81	81.12	93.93	6.254	13.10	Paraffin, Rosin.	Manufacturing Wax.
15	62.45	9501	18.91	71.51	90.42	3.776	13.83	86.33	100.16	6.232	9.11	Paraffin.	Pure Unbleached Wax.
16	63.76	9520	20.30	74.20	94.50	3.655	14.86	89.57	104.43	6.027	7.42	—	"
17	62.81	9690	21.70	81.90	103.61	3.772	15.89	98.86	114.75	6.221	4.31	Probably Japan Wax.	Pure Bleached Wax.

Above is given a table embodying the results of the analysis of sixteen samples of the wax as received, of these eight were pure and eight adulterated.

Wax number one is placed at the head as a standard because it is of known purity and is not to be included in the sixteen samples.

Neither number *three* nor number *nine* contained any detectable adulterant yet the ether number is low. Several trials were made, in both cases, to obtain a higher ether number but without success.

Each sample was boiled for *two hours* so that saponification ought to have been complete, yet the difficulty might lie here, for R. Benedikt and K. Mangold say<sup>1</sup> that this method is attended with the disadvantage of saponifying some kinds of wax with difficulty. These investigators base their results on what they call "aufgeschlossenes Wachs."

In view of the facts that some wax saponifies with difficulty, that no adulterant was found and the remaining data were approximately normal, these waxes claim a position among the unadulterated.

Samples number *two* and *twelve* contain stearic acid or an equivalent, yet the specific gravity and the melting point conform in each case as nearly to those of pure wax as could be required. How the manufacturer succeeded in doing this is a question for us to solve.

Heintz<sup>2</sup> has shown that by mixing stearic and palmitic acids in different proportions a melting point varying from 69.2° C. to 55.1° C. can be secured. Was it a mixture of this kind? The writer was unable to determine.

The use of stearic acid, as an adulterant for beeswax, must be of comparatively recent date for Hassal, in his admirable work, who generally enumerates every conceivable adulterant, does not allude to it, and Allen, in his Commercial Organic Analysis, **2**, 213, says it is "Less frequently employed than some of the other adulterants."

The results above show, and other recent investigations corroborate it, that stearic acid is employed almost as extensively as any other adulterant for this purpose.

Rosin was found only in the sample designated "Manufacturing Wax."

Indications point to the presence of Japan wax in number seventeen, but nothing definite can be ascertained, owing to the present inefficient methods at our disposal.

<sup>1</sup> 1891, Chem. Ztg., **15**, 474.

<sup>2</sup> Ann. der Physick, **92**, 588; Dragendorff's Plant Analysis, 1884, Eng. Ed., p. 15.



Below is a table embodying the properties of the various substances employed in adulterating beeswax. A few of the data are those of the writer, but the majority were secured from various sources in literature.<sup>1</sup>

SUBSTANCE.	Melting point.	15° C. specific gravity.	Acids soluble in water.	Acid number.	Ether number.	Total.	Iodine fixed by one gram of wax.	Volume of Hydrogen at 0° C. and 760 mm. pressure given per gm.	Hydrocarbons from one gram of wax.
Yellow beeswax, . . .	62-64	'961- '964	0-1	19-21	73-76	91-97	8-11	53-57.5	12.5-14.5
Beeswax bleached by various agents, . . .	63-64	'960- '973	0-2	19-23	74-84.29	93-107.7	1.08-11.36	51-57	11-14.30
Cacao butter, . . . .	30-33	'945- '982	0	0-3	192-200	192-204	34	—	—
Carnauba wax, . . . .	83-84	'999	0	4-6	75-76	79-82	7-9	73-76	1.6
China wax, . . . . .	53.5	'970	2	22	196	218	6.85	72.3	0
Japan wax, . . . . .	47-54	'975	2	18-28	194-198	216-222	6-7.55	69-71	0
Mineral wax, . . . . .	60-80	'918- '952	0	0	0	0	0-0.6	0	100
Paraffin, . . . . .	38-74	'913- '914	0	0	0	0	17-31	0	100
Resin, . . . . .	53.5	1.104-1.108	0	168	10	178	135.6	35	0
Spermaceti, . . . . .	40-50	'945- '96	0	0-2	136-142	136-144	—	—	—
Stearic acid, . . . . .	53.5-69.2	'901-1.00	0	204	5	209	2-4	0	0
Suint wax, . . . . .	62-66	—	0	95-115	4-7	102-119	13-18.5	0	14-18
Tallow, . . . . .	42-50.5	'952- '96	0	2.75-5	193-208	196-213	27-40	52-60	0
Vegetable wax, . . . .	47-55.6	'947	2	17-19	200-210	218-220	6.6-82	73-74	0

# GENERAL CONCLUSIONS.

Beeswax in our markets is adulterated to the extent of 50 per cent. while in English markets it rises to 66⅔ per cent.

The melting point of beeswax varies from 62-64° C.; it is raised by adding carnauba wax, stearic acid, certain mineral waxes and paraffins. China wax, Japan wax, cacao butter, resin, tallow, spermaceti, vegetable wax, certain stearic acids and paraffins lower it, while it is apparently unaltered when adulterated with suint wax, certain mineral waxes, paraffins and stearic acids.

Beeswax varies in specific gravity from .960-.973 and appears to be greatly influenced only by resin, carnauba wax and certain mineral waxes, which increase it, and paraffin which lowers it.

The "Acid Number" ranges from 19-21 mgs. of potash per

<sup>1</sup> 1882, Dieterich, Arch. der Pharm. (3), **20**, 454. 1885, O. Dammer, Illustriertes Lexicon der Verfälschungen, etc. 1891, A. and P. Busine, Bull. Soc. Chim. (3), **5**, 654. R. Benedikt, Analyse der Fette und Wachsarten, Zweite Auf., 311, *et seq.*

gram of beeswax. Stearic acid, resin, and suint wax increase while carnauba wax, mineral wax, cacao butter, paraffin and spermaceti decrease the acid number. China wax, Japan wax and vegetable wax do not vitiate the number seriously.

The "Ether Number," varying from 73-76 mgs. of potash per gram of beeswax, is unaffected by adding carnauba wax but China wax, Japan wax, cacao butter, tallow, vegetable wax, increase it. Mineral wax, paraffin, resin, stearic acid and suint wax decrease it. It must be noted that wax bleached by certain chemical agents may have an ether number as high as 84 and yet be pure.

The percentage of iodine varies from 8-11, yet wax bleached by certain agents, as chlorine, may vary far from these percentages. Paraffin, mineral wax and stearic acid lower the percentage, but cacao butter, resin, suint wax and tallow increase it. China wax, carnauba wax, Japan wax and vegetable wax pass the prescribed limits but very little.

The volume (53-57.5 cc.) of hydrogen evolved from one gram of beeswax and the percentage (12.5-14.5) of hydrocarbons evidently are the most reliable data securable. The former being vitiated by all adulterants except tallow and the latter by all except suint wax. —Laboratory, Smith, Kline & French Company, Philadelphia, Pa.

## WEIGHTS OF THE UNITED STATES PHARMACOPŒIA, 1890.

BY ALLEN SHRYOCK, PH.G.

Read at the Pharmaceutical Meeting, November 21, 1893.

A careful examination of the United States Pharmacopœia presents the following facts, which may be of interest to friends of the Decimal System.

The greater proportion of quantities indicated by weight, come under the head of 1000, 100 and 10 Gramme weights.

The following table will show about the number of times that each particular weight is directed throughout the Pharmacopœia :

			Times.
1,000 gramme weight,			167
100	"	"	110
10	"	"	49
200	"	"	38
50	"	"	34
20	"	"	33

	Times.
4 gramme weight, . . . . .	24
500 " " . . . . .	19
6 " " . . . . .	18
40 and 150 gramme weights, each, . . . . .	17
1 " 30 " " " " . . . . .	16
5, 15 and 80 gramme weights, each, . . . . .	15
60 gramme weight, . . . . .	14
2 " " . . . . .	13
90 " " . . . . .	12
12 and 800 gramme weights, each, . . . . .	10
65 " 700 " " " " . . . . .	9
25, 120, 300 and 400 gramme weights, each, . . . . .	8
3, 8, 70 " 85 " " " " . . . . .	7
13 and 180 gramme weights, each, . . . . .	6
35, 140, 350 and 850 gramme weights, each, . . . . .	5
7, 45 and 750 gramme weights each, . . . . .	4
9, 18, 34, 38, 55 and 650 gramme weights, each, . . . . .	3
33 56 75 93 95 98	
125 160 170 250 330	
600 720 760 944 gramme weights, each twice.	

The following weights are directed but once :

16	17	19	27	29	31	46	47
57	63	67	71	77	78	83	94
110	130	175					
219	220	230	236	240	260	280	
310	319	320	340	370	375	410	490
520	550	555	580	640	670	675	680
770	825	840	870	900	920	925	950
1050	3200		6000				

Decimal quantities, each once, as follows :

·06 — ·16 — ·2 — ·50 — ·5 — 1·2 — 2·5 — 6·5 grammes.

We find that in making up all the preparations given in the U. S. P., of 1890 (where weight is indicated), that about 122 different quantities are directed, while the number of times that these quantities are expressed in Gramme Weights, including duplicates, are about 906.

In view of the fact that the correct working of the formulæ of the U. S. P. involves 122 different weights, 906 times in all, it is of the greatest importance to the pharmacist to be able to weigh these quantities with accuracy and despatch.

*In no other way* can this be done, but by the *direct* use of the *metric weights*.

The conversion of these weights into their relative *exact* equivalents is an utter impossibility—and though the error may be of no practical importance, it is certainly no true representation of the terms employed.

If we wish to weigh 1,000 Grammes let us use a Thousand Gramme Weight—and not 32 Troy Ounces and 72.4 Grains.

If the Decimal System is our *theory*, let the Decimal System be our Practice also.

The total weights added together of all the quantities indicated in the U. S. P. amounts to about 277,700 Kl. Gr., and the total resulting error collectively by the substitution of Ounces and Grains in the place of Kl. Grms. amounts to over 12,000 Grains, or about one-twenty-fifth of a Grain to the Kil. Gr.

Another curious fact brought out in connection with the substitution of Troy Ounces and Grns. for Kil. Grms. Allowing one minute for consulting the table for converting each of the 906 Weights mentioned into Troy Weight, we are wasting over fifteen hours' time beside risking chances of error.

In view of these facts why not adopt the System bodily which our faithful and honored committee have given us after so much labor?

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## THE UNITED STATES PHARMACOPŒIA OF 1890.

BY GEORGE M. BERINGER, A.M., PH.G. —

[Continued from p. 528.]

On page 167, we are told that *syrupus sarsaparilla compositus* is made from the compound fluid extract of sarsaparilla. It is the fluid extract of sarsaparilla that is directed in the formula for syrup and not the compound fluid extract.

The formula and process for the manufacture of Ferric Chloride should be omitted. It is now supplied in a pure condition, and at such price by manufacturers that the pharmacist will not attempt its preparation.

As the *soluble* Citrate of Iron and Quinine has been introduced, in which the percentage of Iron and Quinine is practically the same as in the Iron and Quinine Citrate, the latter might now be omitted.

In the preparation of Saccharated Ferrous Iodide, one per cent. of reduced iron is added to preserve the ferrous iodide from change to ferric salt. The term "soluble" has been attached to the official



title for Ferric Phosphate and Ferric Pyrophosphate, and serves well to indicate that these are not the pure chemical salts that the names previously adopted seemed to indicate.

Granulated Ferrous Sulphate is no longer directed to be granulated by the addition of alcohol to the concentrated aqueous solution. Alcohol is only directed to be used to wash the product granulated by constant stirring while the saturated solution is cooling.

Ferric Valerianate is admitted to be of varying composition, and the chemical formula is omitted.

Glycerites of Carbolic Acid and of Tannic Acid are two old friends of 1870, restored to their rightful position. In the latter, the directions should require that the tannic acid and glycerin be rubbed in a mortar to a smooth mixture, and then transferred to a capsule and heated on a water bath until dissolved.

In Glycerite of Starch 10 per cent. of water is introduced in place of that amount of glycerin. Glycerite of boroglycerin and Glycerite of Hydrastis are two new additions. The former is a deserved recognition of a frequently used and good remedy, the latter we are doubtful about.

The official Mercurous Iodide is *yellow*, and this is indicated in the title by changing "*viride*" to *flavum*, and it is now directed to be made by precipitating mercurous nitrate with potassium iodide. Manufacturers have for years listed both yellow and green mercurous iodide, the color being dependent on the amount of mercury present. The Mercuric Iodide is made as heretofore from mercuric chloride and potassium iodide, but the solutions of the salts are directed to be simultaneously poured into a quantity of distilled water.

That the formula of the Pharmacopœia of 1880, for Mercury with Chalk was very unsatisfactory is admitted, and we are not sorry to see it abandoned. In the Pharmacopœia of 1890, clarified honey is used to disseminate the mercury. It is to be observed, that the formula prescribes 105 gm. of material to yield 100 gm. finished product, which would require a loss of 5 gm. (50 per cent.) of moisture by the honey.

We are somewhat surprised to find the hydrochloride of the artificial alkaloid *hydrastinine* introduced, and not the alkaloid *hydrastine* from which it is derived. While the reports of the hæmostatic value of the former are favorable, we were not aware that its use had extended beyond the experimental stage, but the latter has been

extensively used for some years, especially as an application to mucous membranes, and the alkaloid hydrastine or its hydrochloride should have been introduced.

Hyoscine Hydrobromide and Hyoscyamine Hydrobromide are deserved admissions. Aconitine and Homatropine Hydrobromide should also have been admitted as their use would necessitate recognition.

Infusions and decoctions have both been reduced to five per cent. unless otherwise directed, and maceration in the former is directed for an half hour only. The formula for Infusion of Digitalis is changed again. In 1870, tincture of cinnamon was directed; in 1880, cinnamon and now cinnamon water. The digitalis is now rightly directed to be bruised not powdered. Maceration is only until the mixture is cold, not for two hours as heretofore.

Iodoform is official only in crystals, but it is now generally seen in powder only.

Jalap is still required to yield "not less than 12 per cent. of resin." Shortly after the revision of 1880, Dr. Squibb, Turner and Drescher, all reported examinations showing that the jalap in the market yielded less than 10 per cent. resin. While recently, some lots have appeared in the market yielding 12 per cent. that requirement would exclude most in the market. It would have been as well to have fixed the limit at not less than 10 per cent.

Lemon Peel is official for the sole purpose of using it in spirit of lemon, yet the lemon peel described under the official title of "Limonis Cortex" is not that directed in spirit of lemon. The description should be "*the outer or yellow epidermal surface grated from the ripe fruit.*"

Linimentum Calcis is again *linseed oil* and lime water, old "carron oil." The substitution of cotton-seed oil in this and in Linimentum Ammoniaë by the Pharmacopœia of 1880, was an inexcusable blunder and the retention of this oil in the volatile liniment of 1890, is a persistent continuation in a palpable error which is beyond explanation. Olive oil is admittedly the best for this purpose, producing the smoothest and thickest liniment. The very consistence of the liniment produced, giving it the property of retaining the ammonia for a time, assuring the action desired and rendering it more valuable than the other oils which saponify less perfectly with ammonia. It is amusing to note the substitutes that have been proposed

*rancid* cotton-seed oil, paraffin oil, lard oil, linseed oil and the new Pharmacopœia proposes cotton-seed oil with the addition of some alcohol. The change to cotton-seed oil has been excused by the statement that pure olive oil was not obtainable. This argument, if valid, would require the substitution of cotton-seed oil soap for the official soap and the use of cotton-seed oil in lead plaster and other official preparations. At no time within the last 15 years has it been difficult to obtain either in Philadelphia or New York olive oil of such purity and at moderate prices yielding satisfactory pharmaceutical preparations. The formula of the Pharmacopœia of 1870 for volatile liniment has not been improved upon, and should have been reinstated in the revision of 1890.

In Soap Liniment, the soap is directed to be in fine powder ; as the official soap is in lump and containing considerable water (not over 36 per cent. U. S. P.) I presume this is soap which has been dried. If so, the formula should read " Soap previously dried at a temperature not exceeding (100° C. ?), and reduced to a fine powder 70 gm."

Ground Flaxseed, if pure and recently prepared, will yield 32 to 35 per cent. of fixed oil, yet the official requirements are only 25 per cent., which would admit of considerable adulteration.

In the formula now adopted for Basham's mixture, glycerin is used in place of the syrup. The iron strength still remains at 2 per cent. of tincture by volume—too weak. The original formula for this preparation contained a little over 6 per cent. by volume.

In the Solution of Magnesium Citrate, the water should be directed to be boiled and used, while hot ; this renders the solution more permanent, probably by destroying fungus spores. The amount of syrup directed in this preparation, 120 cc., is entirely too much, 60 cc. would be sufficient.

In Solution of Chlorinated Soda a decided excess of sodium carbonate is directed rendering the finished product distinctly alkaline, as it should be.

In Liquor Ammonii Acetatis the second process of the previous Pharmacopœias, in which the ammonium carbonate and acetic acid were prepared in separate solutions and these mixed at the time needed, has been discarded. By many *practical pharmacists* this is deemed the better of the two processes. The term "spirit of mindererus," has become obsolete and is so inaccurate a name, according

to our present idea of a spirit, that it should be omitted as an official synonym.

Effervescent Lithium Citrate should have been directed to be granulated. Using the salt and not the lithium carbonate and citric acid, to prepare same when dissolved, tartaric acid could have been substituted for the citric acid to produce effervescence.

While native Manganese Dioxide, containing 66 per cent. of the dioxide, is pure enough for preparing chlorine water it is not sufficiently pure for internal administration. Manganese dioxide is now largely administered as an emmenagogue and alterative and a pure oxide should have been introduced for this purpose and a note of caution under the present official oxide, explaining that it was not intended for internal use.

Very little of the *natural* copaiba will yield Mass of Copaiba by the official process until a portion of the essential oil is distilled off. The addition of one per cent. sodic hydrate dissolved in a little water improves the solidification of the mass.

The introduction of Methyl Salicylate into the Pharmacopœia is unwarranted by either use or character of the product. Its principal use has been as an adulterant of the natural oil of wintergreen and a test that would readily detect its presence in this oil has been a desideratum. As a product, it is itself liable to contamination with other synthetic products from impurities present in the salicylic acid used in its manufacture, and it is, in addition, notoriously adulterated.

Its introduction into the Pharmacopœia, is accompanied with tests for the detection of some of these adulterants. The official tests for methyl benzoate would fail to detect the presence of a small amount of that product. It lays claim to no superiority and possesses no advantages over the natural oil of wintergreen. The latter is extensively used both internally and externally, and I have yet to see or hear of the physician who knowingly ordered or accepted the synthetic oil. On the other hand, the statement is made by some that the salicylic acid made from the natural oil of wintergreen has a better remedial effect than that made synthetically. The only claim that methyl salicylate appears to advance is that it is a cheap substitute. While this might appeal to the soap manufacturer it is beneath the self-respect of the honest pharmacist and the dignity of the Pharmacopœia to recognize such reason. This introduction of



synthetic oil of wintergreen becomes a dangerous precedent. If synthetic oil of wintergreen is to be officially recognized, why not introduce also the synthetic essential oils of almond and of mustard?

The theoretical necessity for a more accurate classification of the pharmacopœial preparations, alone, seems to have decided the Committee in dividing the old class of mixtures. In the past, pharmacists have felt the need of at least one class of liquid preparations, wherein might be grouped such preparations as could not be properly classed under the more rigid titles, as tinctures, syrups, liquors, etc. The title "mistura" was deemed sufficiently elastic, and it has always conveyed the idea of a heterogeneous group of remedies. This want has been universal and in the British Pharmacopœia and in other national pharmacopœias, we have similar groups under this title. Under the new classification mixtures are more nearly related to the emulsions than heretofore. It remains to be seen if the new class "Emulsa" will be more graciously received than were the abstracts of the Pharmacopœia of 1880.

Some peculiar changes have necessarily resulted in the formulas for these preparations. In brown mixture, syrup and mucilage of acacia are now directed in place of sugar and powdered acacia. We can see no advantage from the change.

The marked changes made in the formula for *Mistura Rhei et Sodæ* are such that we cannot approve. To make this formula conform strictly to the newly adopted idea of a mixture, 35 per cent. by volume of glycerin is introduced. But why has ipecac been added to the formula? It is to be observed, that the amount of ipecac is one-fifth that of the rhubarb; now one grain of ipecac is quite as active comparatively as the five grains of rhubarb, and this if desirable to be introduced should be indicated in the title.

Oleate of Mercury now is made by dissolving 20 parts of yellow oxide of mercury in 80 parts oleic acid. The 20 per cent. oleate will be found more permanent than the 10 per cent. of 1880. The red mercuric oxide finely powdered and dried answers as well as the yellow oxide. This formula, however, still leaves a decided excess of oleic acid not in combination. The true oleate prepared by double decomposition (and containing but a very small amount of free oleic acid due to acidity of the metallic nitrate solution used) should have been introduced. Oleate of zinc of the Pharmacopœia is likewise a solution of 5 per cent. of the oxide in oleic acid. It

forms a hard, unctuous mass. This should have been the impalpable powder obtained by precipitation from solutions of alkaline oleate and zinc sulphate. Almost all the zinc oleate of commerce is the latter.

The entire class of oleoresins is directed to be prepared by exhausting the powdered drug with ether (stronger ether of U. S. P. 1880<sup>1</sup>). The complete exhaustion of the drug directed is wasteful of the ether, as experiments have shown that it is not advantageous to continue the percolation beyond that point necessary to obtain 150 to 200 cc. of percolate for every 100 gm. of the drug. The small amount of oleoresin yielded by continuing the percolation till the drug is completely exhausted will not pay for the ether lost. For some of these oleoresins a cheaper solvent would have been acetone. (See *Amer. Journal of Pharmacy*, 1892, 145.)

In the statements regarding the characters and properties of both the fixed and volatile oils we notice a decided improvement. Many of the errors in the *Pharmacopœia*, 1880, in stating the physical properties of the essential oils are corrected.

It is to be noted that in the *Expressed Oil of Almond* the solubility of the separated fat acids in alcohol is adopted to detect the admixture of other fixed oils, and in lard oil and olive oil the reduction of silver nitrate in acidified alcoholic solution is applied for the detection of cotton-seed oil. The iodine absorption test of Hübl is generally accepted by chemists as a valuable test for adulterants in these oils. It has nowhere, in the volume, been directed, probably because it was thought too difficult for the average pharmacist. Yet the only apparatus it requires, a burette and a bottle or a beaker should be in every pharmacy. In marked contrast to this, we note that in a number of the essential oils the optical rotary values are given and on p. 512, we find instructions for determining the same. The polariscopic apparatus needed is not in the possession of the pharmacist. In many cases, the natural variations of the oils in the optical behavior and the causes affecting the same are still to be further investigated.

The *Oil of Bitter Almond* should have been "sine prussic acid" or if that was deemed unnecessary, at least the percentage of hydrocyanic acid allowable should have been stated. The test for synthetic oil, by detecting chlorinated compounds has proven very satisfactory in the writer's experience.

[*To be continued.*]

## ROSE CULTURE IN BULGARIA.

From the World's Fair Circular of Shipkoff & Co., Kizanlik.

The culture of roses in Bulgaria for the purpose of extracting the Otto of Rose is not only the oldest and most attractive industry of the country but also quite exclusively our own. While roses are found all over the world and are grown everywhere in garden-beds, in Bulgaria they are grown in extensive fields, as you grow here the potato or the vine. This industry, however, is confined only to one special district in Bulgaria, which is comprised in the eight counties above mentioned, with Kizanlik as their central town, called in consequence the capital of the rose district. The rose district extends along that portion of the southern slopes of the Balkan Mountains, comprising in itself the whole branch range of the Little Balkans, which shoots out of the main Balkans and forms one of its chief arms. The average length of the rose district is about eighty miles, and its average width is about thirty miles. Its average elevation is about 1,300 feet above the level of the sea. The average height of the Balkans along the rose district is about 5,600 feet, while that of the Little Balkans is about 3,700 feet.

Attempts have often been made to grow roses all over Bulgaria but they all have proved a failure. It is true that roses have been grown and are grown to this day in Persia, India, Egypt and China for this purpose, but they hardly produce any Otto of Rose. They produce almost exclusively rosewater, and it is chiefly used for local consumption. In the "Maritime Alps" of Southern France, and especially in Cannes and Grasse they grow quite extensively the "Provence rose" and they extract from it a peculiar Otto of Rose, but the quantity is very limited and they chiefly use their flowers to make pomades and rosewater. In Leipzig, Germany, they also grow the roses but with very little success. Almost in all the other places where the roses are grown, they lack the peculiar advantages of climate that we possess, and have in consequence to use twice and even thrice the quantity of flowers to make the same amount of Otto. The hottest weather we ever experience in summer is 88° F. and the coldest of winter is rarely under 15° F. above zero. Then, during the harvest and the distillation season, which is in the latter part of May and the first part of June, we have regular showers of rain, and in the mornings heavy falls of dew—both absolutely necessary for the Otto of Rose distillation.

After the Russo-Turkish war in 1877-78, when Bulgaria was separated from Turkey and constituted into an independent principality, the Turkish government spent thousands of dollars in trying to replant the Kizanlik rose in Asia Minor and many scores of rose gardens were planted around Broussa, but to no purpose. The gardens grew, thrived and yielded plenty of flowers, but when distilled they got only rosewater, and very little Otto, and the work in consequence, could not pay. It is the peculiarity of the soil and chiefly that of the atmosphere of this special district in Bulgaria, caused by the peculiar formation of the mountain ranges surrounding it, which make the roses thrive and yield sufficient Otto of Rose to pay for the very laborious work that the culture entails.

The roses we grow are only of two kinds: red and white. The red rose, which affords the chief ingredient of the Otto, is of the variety known as *Rosa Damascena*, and the white rose, is a variety of the musk rose (*Rosa Muschatta*). These two varieties are grown nearly everywhere, but nowhere in the world do they resemble our roses.

Our red rose is a semi-double light red rose like the French *rose du roi*, having from thirty to thirty-six petals and possessing an extremely rich and fragrant odor. There are now in the entire rose district over 5,500 acres of rose gardens scattered in 150 different villages, and at the end of May, when the roses begin to blossom, the whole atmosphere in the district is full of their aroma.

The growing of the rose is very much like the growth of the vine, and the planting of a rose garden is similar to that of a vineyard. After the ground has been prepared by tilling and manuring, ditches are made in rows, about a foot and a half in depth and width and a yard and a half apart. At the bottom of these ditches soft earth mixed with manure is spread, on which the roots forming the bushes of the new rose garden and taken from old bushes are firmly stuck vertically, and then well covered up with the earth and manure. This is generally done in the spring, when the rain showers abound. The roses thus planted soon take root, and in less than two months send up soft, glossy, green shoots, which in a year become about a foot high. In the second year they are over two feet high, and yield a few rose flowers. The first crop worth gathering is in the third year, and in the fifth year they attain their full growth. They



reach then a height of about six feet, the bushes forming thick rows of clustered rose trees and continuing to yield rich crops of flowers for a period of twenty years, and in some localities, twenty-five years, after the lapse of which time they become old, begin to die from the winter's cold and frost, and yield but few flowers. Then the old rose bushes are dug out and the garden is planted anew.

A rose garden requires constant care. During the year it is hoed three times. In autumn the roots are covered up with earth to guard them from the winter's cold. In spring that earth is thrown off and the bushes are pruned, and every other year the garden is manured.

The roses yield only one crop every year. The rose harvest begins in the second part of May, and as the weather is dry and hot or cool and rainy during the blossoming season, it may last from eighteen to thirty days. During the whole harvest the distillation of the crop is carried on. Morning after morning, hours before sunrise groups of young maidens and boys, all dressed in their beautiful bright-colored native costumes, proceed with sweet songs to the rose gardens to gather the newly opened buds, while the heavy morning dew is still on the blossoms. Nothing can present a more captivating scene than a rose garden in bloom, with its gaily attired peasant girls gathering the roses, and its nightingales—those romantic lovers of the *Regina florum*—trying in most melodious song to out-sing the maidens.

As soon as the roses are gathered they are taken to the distillery, spread in cool and shady rooms and gradually distilled during the day. The alembics used for this purpose are of the simplest kind. They consist of a convex tinned copper boiler, narrowed at the top to a neck on which is fixed a spherical head-piece with a tube on one side, to which is attached the condensing tube, sloping down and passing through the condenser or refrigerator, a large vessel into which cold water is constantly running. The capacity of the boiler is about 250 pounds of water. In distilling the roses from twenty to twenty-five pounds of flowers are put in it and from five to six times that much of water, thus filling nearly three-fourths of the boiler. This done the headpiece and condensing tube are tightly attached, the fire started and the distilling of its contents begun. This is carried on about forty-five minutes until thirty to thirty-five pounds of rosewater are extracted from each boiler. The boilers

are then emptied, cleansed with clear water and the same process is repeated until all the morning gathered flowers are distilled. The rose-water extracted from the first distillation is redistilled in the same way, only in this second distillation from 100 to 120 pounds of rose-water is used, and out of it they extract some thirty to thirty-five pounds of second rosewater. This double distilled rosewater is very strong in odor and quite turbid in appearance; it is full of tiny yellow-white oily globules floating in it, and as the bottle is filled they rise up and gather on the top of the long-necked bottles in which the rosewater runs. These globules are the Otto of Rose, and when all the oil has settled on the tops of the bottles it is skimmed and put in separate bottles by little conic-like spoons, with a little hole in the bottom, large enough to let the water run out, but not the oil.

There are at present about 5,500 acres of rose gardens in the entire rose district, which produce annually from 17,000,000 to 21,000,000 pounds of flowers, or about 5,400,000,000 roses. A rose garden, an acre large, yields under the most favorable circumstances from 4,000 to 4,500 pounds of roses, out of which amount is extracted from twenty to twenty-five ounces of Otto of Rose. It takes generally from 180 to 220 pounds of roses to make one ounce of Otto of Rose, and there are about 300 roses to the pound. The total amount of Otto of Rose produced annually in the whole district varies according to the seasons, from 60,000 to 100,000 ounces of Otto of Rose. Last year the whole crop amounted to about 60,000 ounces, while this year the crop will not exceed the total sum of 80,000 ounces. Nothing can be positively known of the yield of a crop before it has been fully distilled. Many things damage a crop, as hailstorms in autumn, excessive cold in winter, early and deceptive spring, white frost during the budding season, and hot and dry weather during the harvest. The last two cause the greatest damage to a crop.

Nearly all the Otto of Rose produced in Bulgaria is exported for consumption abroad. Its three largest markets are Paris, London and New York, from where it is distributed all over the world. All the principal perfumers procure now their supply direct from the native manufacturers and exporters.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, November 21, 1893.

The meeting was called to order and Jos. W. England was asked to preside.

The reading of the minutes of the last meeting was, on motion, dispensed with, as there was a great deal to hear and act on.

A copy of the last edition of the German Pharmacopœia was presented to the library by Geo. M. Beringer, Ph.G., and a copy of Nicholas Le Febures' complete body of chemistry was presented by our fellow-member, F. H. Rosengarten, who received it from the late E. C. Knight, of this city, who placed much value on it, as it dated as far back as 1670, and abounds in many original statements.

A paper upon the effects of noxious gases upon the animal economy, by Mr. J. R. Wilson, was read by Dr. C. B. Lowe, Mr. Wilson being too unwell from a severe cold to read it himself. The paper was listened to with great attention, and was referred to the Committee on Publication, and a vote of thanks was tendered to Mr. Wilson.

Mr. Charles E. Hires read a paper upon Vanilla, its sources, cultivation, methods of preparing for the market, commercial statistics relative to it, the whole being the result of a visit made to the country from which the largest part of the Vanilla supply of commerce is derived. The trip may be called an adventure, as the country is inhabited by as lawless a race as can be found anywhere; to this must be added the danger of contracting that terrible scourge of the tropics—yellow fever. On motion of Mr. Beringer, a vote of thanks was passed to Mr. Hires for his interesting paper.

The third paper, upon the examination of various commercial samples of wax, was read by Lyman F. Kebler, Ph.C., B.S. It was listened to very attentively, and was one of the best and most thorough examinations that has been given to the subject. It was also referred, after which the meeting passed a vote of thanks to the author. Mr. Beringer exhibited a sample of Carnauba wax, a drug of Brazilian origin, which melts at quite a high temperature.

Mr. Allen Shryock read a paper upon the weights of the Pharmacopœia of 1890, and urged the use of the decimal WEIGHTS and not any equivalents obtained by calculating how many troy or avoirdupois grains would give an equal quantity. This paper was also referred to the Publication Committee.

Mr. Ellis inquired if the artificial product Vanillin has affected the sale of Vanilla, to which answer was made it had not; that it did not represent Vanilla bean flavor as it should; it bears about the same relation to Vanilla bean in flavor as the ethereal fruit essences do to the real fruit juices.

G. M. Beringer called the attention of the meeting to one of the newer remedies, Ethylene Bromide,  $C_2H_4Br_2$ . Viewed as an addition product of Ethylene  $C_2H_4$ , this would be the correct name, and was the one generally used in prescribing; but viewed as a substitution product of ethane  $C_2H_6$ , it was Di-Brom-Ethane. This is now being recommended as an anti-epileptic, in doses of 0.1-0.3 gm., 2 or 3 times a day, and may be administered in capsules or emulsion. As supplied by the German manufacturers, it is a slightly brownish colored liquid, due to traces of bromine, sp. gr. 2.163 at 21° C., crystallizing at 10° C. He exhibited a sample which had been redistilled by Mr. Chas.

Bullock. About 20 per cent. of the commercial product distilled below the boiling point, showing that it was far from pure. The purified article was a heavy colorless liquid, sp. gr. 2.166, having a pleasant, almost chloroformic odor boiling at 127° C. (260° F.) and leaving a greasy stain on paper persisting for some little time. It was soluble in alcohol, but insoluble in water. In large doses it is said to be poisonous.

It was suggested that as the meetings were growing in interest, that it would be better to commence at three o'clock, and it was so determined.

T. S. WIEGAND.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

*Pennsylvania Pharmacy Board.*—The State Pharmaceutical Examining Board of Pennsylvania held an examination in the Central High School at Philadelphia, on Saturday, October 14, and in the City Council Chambers at Pittsburg on Monday, October 16, 1893.

Two hundred and seventy-three candidates appeared for examination, one hundred and forty-seven applying for Registered Pharmacists Certificates, and one hundred and twenty-six for Qualified Assistants Certificates. Forty-five of the former and fifty-two of the latter class were successful.

The next examination will be held at Philadelphia in January. Applicants for examination should apply to the Secretary of the Board, Charles T. George, Harrisburg, Pa., after the middle of December, for the necessary blank form of application, and the exact time and place of the examination. Applicants should always state, when applying for blanks, for which certificate they wish to be examined.

## EDITORIAL.

Prof. Edson S. Bastin, A.M., successor to the late Prof. John M. Maisch, took charge of his department at the beginning of November and was tendered a reception by the Board of Trustees on Saturday evening, November 18, at 8 o'clock. Following the reception, Dr. Charles L. Mitchell, Class of 1872, exhibited stereopticon views illustrating a summer tour in Europe. Quite a large number of members and graduates of the College were present to welcome Professor Bastin to the faculty.

Professor Bastin came to our Alma Mater from Chicago, where he had been successfully imparting his knowledge both at the Chicago and then at the Illinois College of Pharmacy and will continue his successful teaching here in Philadelphia. The Board of Trustees can be congratulated in selecting Professor Bastin to be successor to the late Professor Maisch, as he is an able and conscientious teacher and will also be well thought of by the students. As the writer gained from several conversations with the late Professor Maisch, he had a high regard for Professor Bastin, both for his teaching and his knowledge.





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